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ABSTRACT

The national focus on occupational education highlights the responsibility of education to provide programs relevant to the needs of society. Representatives from 42 states and three foreign countries heard 13 presentations on such subjects as finance, research, advisory committees, health programs, and cooperative education. These presentations were: (1) "The Amended Vocational Act in Action" by L. Minear, (2) "Dynamics of Technical Education" by J. Dobrovolny, (3) "Training Technicians in Allied Health Post-Secondary Programs" by R. Kuhli, (4) "Research in Technical Education Development of Generalizable Educational Programs in Emerging Technologies" by A. Nelson, (5) "Co-op Programs in Occupational Education" by L. Egan, (6) "Tomorrow's Technology Today" by M. L. Jones, (7) "The Use of the State Advisory Council as Delegated by the '68 Act" by J. Clary, (8) "Accreditation, Licensure and Registry in the Field of Allied Health and Medical Technology Programs" by K. Skaggs, (9) "Occupational Education in the Private Sector" by A. H. Belitsky, (10) "Student Recruitment in Occupational Education" by S. J. Fantl, (11) "The Technician--How Much Mathematics" by F. Juszli, (12) "A Developmental Concept of Vocational Education" by G. Bottoms, and (13) "Preparing Supportive Personnel for New and Emerging Technologies" by W. Brooking. (JS)

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MIAMI BEACH, FLORIDA
APRIL 22 - 24, 1970

PROCEEDINGS •••

NATIONAL CLINIC ON TECHNICAL EDUCATION

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AMERICAN TECHNICAL EDUCATION ASSOCIATION
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HOSTED BY

SOUTHEASTERN REGION
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NATIONAL CLINIC ON TECHNICAL EDUCATION

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and
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PREFACE

The National Clinic on Technical Education for 1970 brought together in Florida 432 technical educators from 42 states and 3 foreign countries. The national spotlight on occupational education at the national, state and local levels is exerting a profound impact on all education, bringing with it a heavy responsibility to provide programs relevant to today's and tomorrow's needs of our society.

Fourteen presentations at this clinic provided pertinent and timely information on such subjects as finance, research, use of advisory committees, health programs, and cooperative education; and, most were concerned with means and ways of providing quality technical education. Opportunities to improve man's environment presents a real challenge to educational institutions providing technical education.

This clinic serves as an example of a cooperative effort provided by the American Technical Education Association, United States Office of Education and the State of Florida. The Southern Region of the American Technical Educational Asscciation and Miami-Dade Junior College were pleased to host the 1970 clinic.

Twenty-six selected exhibitors contributed much to the clinic's success, and the sponsors are grateful for their active participation.

Theodore A. Koschler
Vice President
Occupational Education
Administrative Services
Miami-Dade Junior College

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WELCOME

It is a distinct pleasure for me to welcome you to the National Clinic on Technical Education. I am reminded that this is the second time that you have selected our state for your annual meeting. The Vocational, Technical and Adult Education staff of the Department of Education joins me in extending to you a cordial welcome on your return to Florida. Mr. Floyd T. Christian, our Commissioner of Education, asked that I express to you his appreciation for the excellent work which you are doing in the areas of technical and health occupations education. He sends his best wishes for a successful conference and invites you to return to Florida again next year.

We are especially pleased for you to hold your annual clinic in our state because you represent two of our most dynamic programs, viz., technical and health occupations education. These are programs in which we are vitally interested and they are programs to which a large part of our resources are being committed. It is interesting to note also that the two educational programs with which you are concerned on this occasion are administered by our Technical and Health Occupations Education Section of the Division of Vocational, Technical and Adult Education.

We feel too that it is fitting that your clinic with the theme "Technical Education for a Changing World" be held in Florida, a state that is characterized by rapid change. Florida continues to grow in population at twice the national average, increasing at a rate in excess of 2700 persons every week. We are the ninth most populous state in the nation with an estimated population of six and one-third million and an anticipated growth to seven and one-half million by 1975. Our population density is 111 persons per square mile as compared to 55 for the United States as a whole. Impressive as the population figure of over six million may sound, this total does not include the 600,000 visitors who will be vacationing in Florida on any average day of the year.

As we move into the 1970's Florida leads the nation in employment growth. During the five-year period, 1964 to late 1969, there were 537,800 more jobs in all types of establishments except farms. This brought the total to well over two million wage-salary workers in the state. Non-agricultural employment averaged over 1.9 million workers, an increase of 63 percent for the decade ending 1968. The state's growth in employment far surpassed the nation's rate of increase, 32.6%, for the same ten-year period and growth continues at an amazing rate. "According to projections from Florida Technological University near Orlando, in the next three years that city's population is expected to increase by 130,000 as 50,000 new jobs are created, more than 40,000 new homes are built and 2.6 million square feet

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Presentation by Mr. Robert W. Caldwell, Consultant, Technical Education, Florida State Department of Education for Dr. Carl W. Proehl, Director, Division of Vocational, Technical and Adult Education, Florida State Department of Education.

of commercial and retail selling space is added."[1]

The decade of the seventies is expected to be one of extensive change in the work that people do and in the way they prepare themselves for work. Economists predict that the decade will be marked by the appearance of many new and different industries, many of which will be related to the discovery industries associated with space study and oceanography. Such industries build upon bodies of knowledge that are changing constantly which in turn will require that employees continue their education to remain current with job requirements. "The fact that Florida is becoming increasingly a major world base for air and sea travel will give business and industry here a greater international flavor in the '70's."[2] These international influences combined with the growing demands of emerging technologies will provide a constant challenge for our technical education program. In fact, it is no longer simply a convenience but, in many instances, an absolute necessity that our schools provide opportunity for the employee to continue his education in the area where he lives and works. Equally as imperative is that his education be relevant to his responsibility and that it be available in optional patterns consistent with that responsibility.

The Florida program proceeds from the point of view that technical education is supportive to the professions in all phases of engineering, science, and public services. It requires a comprehensive application of principles selected from among areas such as science, mathematics, communications and social relationships. It may be a one, two, or three-year program depending upon the degree of competence required. It prepares a person for employment as a technician in a selected cluster of occupations. Technicians will be found to be employed in several occupational areas and having broad titles such as engineering technician, life science technician, physical science technician, and public service technician. This point of view reflects the scope of responsibility of our technical education program.

I take great personal pride in the many positive accomplishments of the Technical and Health Occupations Education Section. As visitors to our great state, I would like to share with you some of the dynamic undertakings in which this Section is involved in promoting technical education opportunities for the people of our state. Our Technical and Health Occupations Education Section in the Division of Vocational, Technical and Adult Education has an authorized professional staff of eleven persons who are responsible for promoting technical and health occupations education in our high schools, area vocational centers, and junior colleges. Although technical education, in our view, is a post-secondary program, we believe that technical aides can be prepared at the high school level. Such programs have the additional advantage of providing excellent orientation for participation in post secondary technical education programs. To this end my staff has developed guidelines for establishing and evaluating electromechanical and health service aide programs at the high school level. Presently in progress are similar guidelines for surveying, electronics,

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[1-2] Tallahassee Democrat, Section G, pp, 1-2, February 8, 1970.

design-drafting, and a survey of health occupations for high school students. Electromechanical and health service aide programs are now offered in a limited number of our high schools with further expansion planned for the coming year.

The major thrust of responsibility of the technical education staff is with the post-secondary program. Last year 22 area vocational centers and 27 junior colleges enrolled 27,000 students in 31 technical specialities and in 19 health occupations specialities. Of the total enrollment 25% was in supplemental courses for employed persons. Another 25% completed their training during this period and became available to industry. Rank order of the top six technical education programs in terms of enrollment were data processing, electronics, police science, design-drafting, aeronautical, and industrial management and supervision. In the area of health, rank order of the top six programs in terms of enrollment were practical nursing, registered nursing, nurse aide, hospital ward clerk, surgical technician, and medical laboratory technician.

In addition to its primary function of providing consultative services, my staff supports the statewide technical education program through a variety of activities. Completed recently was a statewide survey to assess technician needs for Florida industries as nearly as this could be determined by employers. In response to the survey 4465 employers of ten or more persons reported 48,351 technicians employed in 14 selected technologies during 1969 and indicated that an additional 18,000 would be needed during the current year. Copies of the summary report are available upon request.

Also prepared by the staff for distribution are guidelines for establishing programs in the areas of design-drafting, civil engineering technology, electromechanical technology, practical nursing, certified laboratory assistants, ward clerk and physical therapy assistant.

Environmental pollution control is a matter of widespread concern at this time. Fifteen of our junior colleges now offer on demand the required courses for certification as water and wastewater plant operators. The technical education staff for the past several weeks has been working with the Florida Department of Air and Water Pollution Control and other agencies for the purpose of identifying appropriate educational programs to meet this critical area of need.

In the area of marine science, we will be working with the Southeastern Fisheries Association and selected advisory committees representing the industry in the weeks ahead. The purpose of this activity will be to examine employment opportunities reported by the fisheries industry and to determine the level of education required to qualify for such jobs.

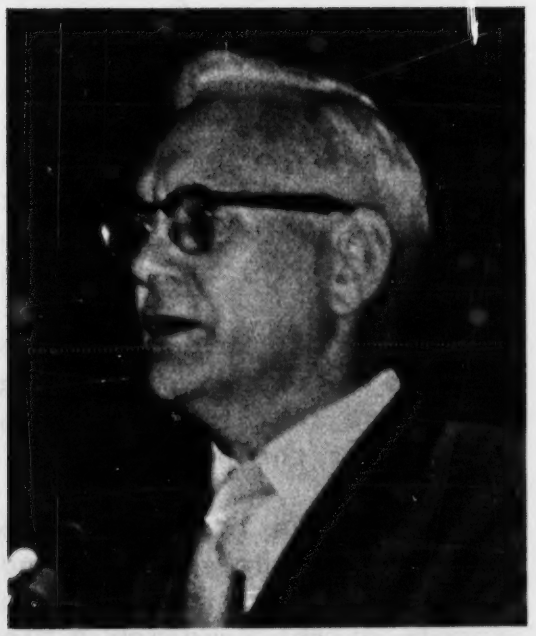
The staff has just completed a series of sessions at the College of Engineering at the University of Florida for the purpose of contemplating use of some of the more recent technical developments in our educational programs. Of particular interest to me is the application of laser beams to surveying and construction activities which appears to have implications for our instructional programs particularly in civil engineering and building construction technology.

The section is working with representatives of the Florida Regional Medical Program in planning for a continuing in-service education program for employed health workers. It is anticipated that this program will be a service provided through our junior colleges and one which literally will take education into the work environment of the employee.

Recruitment of qualified students in sufficient numbers is a continuing problem for many of our technical and health occupation education programs. In an effort to improve recruitment, the section is working with representatives of the Florida Medical Association Auxiliary in promoting health career clubs in our high schools. Presently, there are 150 clubs with a membership of over 5000. The staff is also planning with the Florida Society of Professional Engineers in promoting the Junior Engineering Technical Society. JETS, as many of you know, is a high school youth club which has as its purpose the promotion of interest in technical studies and occupations.

A development in our state which we are watching with considerable interest is the Bachelor of Arts in Technology program which has been approved for a three-year period at the University of South Florida by our Board of Regents. With the firm conviction that technical education is more than a terminal program, we have worked with representatives of the Board of Regents in encouraging the establishment of the program. This is a two-plus-two year program which we believe will provide strong incentive to those who aspire only to become a two year technician as well as to those who ultimately will want additional preparation but with corresponding recognition for that achievement.

Located within a few miles of your conference hotel are three of our area vocational centers and three junior colleges. While you are in the Miami area, I hope that each of you will visit two or more of these institutions. I believe that you will find some highly interesting and exciting programs in progress. We are happy to welcome you to Florida and we extend to you best wishes for a pleasant and rewarding conference.



THE AMENDED VOCATIONAL ACT IN ACTION

There are many signs which augur well for technical education. Recent events make these exciting times for technical educators. Let us review some of them.

A NATIONAL PUBLICITY CAMPAIGN

The National Industrial Conference Board technical careers campaign operated by The Advertising Council was announced one year ago at our St. Louis National Technical Education Clinic. At that time The Advertising Council was ready to launch a national campaign using all media to make the public aware of the many attractive opportunities available for well-prepared technicians and the need for a great increase in the number and kinds of technician and special education programs.

The response to The Advertising Council's campaign has been gratifying. Within a month after it started in May last year, responses from interested parents, students, guidance counselors, employers, and others grew to 10,000 letters per week requesting the booklet, 25 technical careers you can learn in 2 years or less. The booklet was prepared as a public service under the guidance of the U. S. Office of Education, The National Industrial Conference Board, and The Advertising Council. Within a few months the

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Presentation by Dr. Walter J. Brooking, Program Office, Technical Education, U. S. Office of Education for Dr. Leon P. Minear, Director, Division of Vocational and Technical Education, U. S. Office of Education.

number of responses reached as many as 20,000 per week. Over 600,000 of the booklets have been mailed to persons requesting them. Additional requests pour into the Office of Education under the address "Careers," Washington, D. C. 20202, in excess of 10,000 per week. Many letters ask for information in addition to requesting the booklet.

After the booklet is sent, letters which requested it are mailed to the State Director for Vocational Education in the State from which the person wrote. Letters which ask for additional information are answered by the staff of the Division of Vocational and Technical Education.

Many of the States have prepared a list of all schools in the State and the vocational and technical programs offered in each school. These lists are sent to the persons who originally wrote to the Office of Education asking for the booklet.

Numerous letters have been written to the President of the United States; members of Congress; the Secretary of Health, Education and Welfare; the Commissioner of the Office of Education; and other individuals in HEW as a result of the campaign. Many of these letters request that more technical education programs be initiated particularly for our intercity youth to help them choose a technical or specialized occupation and to prepare them for employment in these attractive jobs.

The program will continue for at least another year. We believe that the effect will be far greater than is indicated by the number of people who have written asking for the booklet. The increased awareness caused by this campaign bodes well for growing public support, which has resulted in a demand for more and better technician and specialist education below the baccalaureate level.

PRESIDENTIAL SUPPORT

Recent Presidential messages and statements from the U. S. Commissioner of Education clearly show the importance attached to vocational and technical education.

In his message to the Congress on March 17, 1970, President Nixon proposed a Higher Education Opportunity Act of 1970 to spur reform and innovation throughout higher education in America. Among other things he said:

> "--Too many people have fallen prey to the myth that a four-year liberal arts diploma is essential to a full and rewarding life, whereas in fact other forms of post-secondary education -- such as a two-year community college or technical training course -- are far better suited to the interests of many young people.
>
> "I propose to create a Career Education Program funded at $100 million in fiscal 1972 to assist States and institutions in meeting the additional costs of starting new programs to teach critically-needed skills in community colleges and technical institutes.

"--A youth completing 12th grade in a city without an accessible technical institute is now deprived of a chance for many important kinds of training.

"Throughout this message, I use the term "college" to define all post-secondary education -- including vocational schools, 4-year colleges, junior and community colleges, universities and graduate schools.

"This legislation would create a new program of Career Education in the Department of HEW. The program consists of formula grants to States to pay for part of the cost of starting new programs of career education in critical skill areas in community colleges, technical institutes and other post-secondary institutions offering less than four-year courses of study."

The program proposed by the President would have the following features:

--Federal funds could be used to pay up to 50% of the additional equipment and operating costs of career education programs over the costs of non-career or general education programs.

--Every State would be eligible for a basic grant of $1 million a year, with additional funds allocated on the basis of population.

--Each new Career Education program would be eligible for Federal funds for three years.

--State agencies would determine which institutions and programs receive Federal funds.

--Critical skills are those defined by the Secretary of Labor.

--Total cost in Fiscal 1972 is $100 million.

In the President's March 17, 1970, statement on combating construction inflation and meeting future construction needs, he asked the Construction Industry Collective Bargaining Commission to establish a subcommittee to develop a program to provide leadership and to communicate the need for developing quality vocational education programs with local school districts, unions, and construction contractors. He called for greater acceptance of training in vocational education programs as partial fulfillment of apprenticeship entrance requirements.

The President has directed that this subcommittee devote attention to one of our great national needs -- the need to restore pride in a craft and to promote the dignity of skilled labor. Construction skills are important to the Nation, and they are a source of pride to their possessors. We must

stress that such skills are not only well-rewarded financially, but that they are also a highly regarded and prized national resource -- one deserving of the highest respect.

The Office of Education will work with the States -- in developing State plans for vocational education in secondary and post-secondary education as well as in cooperative education programs -- to emphasize training in construction crafts and to channel these trained people into productive employment.

The Department of Health, Education, and Welfare will encourage States to provide training in construction crafts in its special funds designated for areas of high youth unemployment.

The Department of HEW will collect and disseminate information on experimental and innovative training methods and systems, especially in cooperative programs involving construction unions and contractors.

The President has recommended that the Governors encourage cooperative planning aimed at expanding the supply of construction manpower on a Statewide basis, involving the State Employment Service, the vocational education agency, the State Cooperative Area Manpower Planning System, and other agencies and advisory groups.

BACKING BY THE COMMISSIONER OF EDUCATION

Commissioner James E. Allen, Jr. addressing the 8th Annual Conference of the National Committee for Support of the Public Schools on "The Federal Role in Education Reform," March 27, 1970, stated:

> "The people have a right to be assured that the increasingly large investments in public education that will be called for will produce results. They can no longer be expected to be satisfied with definitions of school quality that focus primarily on such factors as per pupil expenditures, pupil-teacher ratios and teacher salary levels.
>
> "This new demand for performance accountability is observed not only in middle class suburbs, where parents are concerned primarily about college admissions for their children, but is also manifest with even greater urgency in urban ghettos where parents are demanding that schools teach their children to read and to acquire the skills for entering a worthy vocational career.
>
> "The problem with present arrangements is that there is too little factual basis for an understanding of the relationship between expenditures and performance in a school system. This lack of simple <u>accountability</u> hampers efforts to reform public education in all levels. The need to develop and support the procedures to permit accountability in public education is one of the most important tasks facing both the President's Commission on School Finance and the proposed new National Institute of Education -- as well as the general public.

"But the fact of inflation and tight fiscal policies cannot deny or mitigate the present urgent needs of education. Education is unique in that its needs have the immediacy of children now standing ready and waiting for their one-time opportunity for learning. These children cannot be placed in deep freeze to await more favorable educational or economic conditions. For them the time is now.

"Trying to accommodate both these facts of life seems to indicate two appropriate courses of action. The first is to advance the priority of education in the national order of governmental action and thus gain for education a larger share of available funds -- a course to which I am unequivocally committed. The second is to set the house in order. It must be recognized that merely stating that we need more money for education is no longer going to produce it.

"I would be less than candid if I did not emphasize that one of the problems we face in obtaining increased appropriations -- Federal, State and local -- is the widespread conviction that more dollars spent on the present public school system simply will not result in improved educational performance."

OTHER GOVERNMENTAL INTEREST

There has been other governmental interest for improving the qualifications of important skilled workmen and technical personnel and for increasing the number who will be educated. The Department of Defense and the U. S. Office of Education have undertaken a program called MEDIHC (Military Experience Directed into Health Careers) to identify the thousands of enlisted service personnel discharged each year who have served as medical corpsmen or in related branches. MEDIHC's objective is to provide opportunities for them to obtain further civil training and employment in the health field where there is such a serious shortage of qualified personnel.

Another development which promises growing support for technician education is the activity of Governors and their State Advisory Staffs who are calling for more and better vocational and technical education.

Governor J. Rhodes of Ohio has written a book, Alternative for a Decadent Society, which is an unequivocal and eloquent statement of the urgent need for more and better vocational and technical education. Governors Kirk of Florida, Reagan of California, McCall of Oregon, Smith of Texas, Guy of North Dakota, and several others have made public statements and have taken action which demonstrate their support for increased education for the "world of work." Governor Reagan recently initiated a program, funded by California State funds, to start student development programs in 37 community colleges to enroll underprepared and disadvantaged students and prepare them for successful educational programs of their choice.

Recently, Congressional interest has developed in automobile mechanics and specialists, regarding whether or not they should be licensed in the interest of safety and reduced air pollution. The kind of mechanic they are evidently considering is the specialized automobile mechanic whose technical knowledge makes him a diagnostician and competent mechanic and who is in charge of automobile servicing. Perhaps it is not commonly known that there is a sizable demand for persons specialized in racing-car tune-up whose rate of pay is $20,000 to $30,000 a year.

SUPPORT THROUGH ASSOCIATIONS

There is a rising tide of interest among employers and their associations to meet their needs for highly trained technicians and specialists. These actions go far beyond mere rhetorical statements of support. One example is the program promoted by the Texas Construction Industry Council in cooperation with Texas Education Agency, Texas Agricultural and Mechanical College, and the State Commissioner of Education to provide a cooperative (employment), part-time training program for Texas high school students. This program starts in the 10th grade and leads after high school graduation into either apprenticeship and full-time employment, into technical programs in public post high school institutions, or into 4-year colleges of engineering, business, education, or other professional career preparation.

In the 20 months since the program was proposed, it has grown so that by September 1969 over 1,000 9th graders began courses in 16 schools selected for pilot programs. This Texas program is now available in any school that requests it. It might well be considered an example of what a group of employers who constantly face a shortage of qualified, skilled, and technical workers can do to initiate long-range and effective programs of cooperative part-time training on the job, combined with formal related education in the public schools.

Many more programs of this kind are needed. This program does not require Federal support. It was initiated by employers who believe their best interests can be served by taking an active part and investing both time and money in the education of their future skilled workmen, technicians, and other specialists.

Another indication of a growing awareness for better technical and specialist education is shown by public and private scientific and technical societies. The National Sanitation Foundation, the Water Pollution Control Federation, the American Waterworks Association, the American Association for the Advancement of Science, and the Institute for Environmental Sciences have all taken positive action by cooperating with employers and the public to prepare technicians, specialists, and skilled workers in the fields of environmental improvement.

The American Chemical Society, the largest technical society of its kind, with over 100,000 members, for 3 years has had a full-time employee whose responsibility has been to promote the education of chemical technicians and to assist institutions in initiating and improving their programs.

The Bio-Instrumentation Society and the Institute of Biological Sciences have launched a campaign to increase public awareness of the need for biological technicians in the medical and health field; in agricultural, forest, and oceanography occupations; in the pharmaceutical industry.

The Instrumentation Society of America, the American Society for Engineering Education, and many similar organizations are actively promoting the preparation of technicians and specialists.

EDUCATIONAL ACTIVITIES IN THE PRIVATE SECTOR

In the private sector there is growing activity to meet the needs for technicians and specialists through more education.

Major corporations such as Bell and Howell, International Telephone and Telegraph Company, and Litton Industries have acquired or established private technical institutes or have opened new schools in order to meet the demand for qualified technicians.

The YMCA, YWCA and the YMHA, YWHA have increased technical and other specialist educational programs in their institutions or under their direction.

In a number of our large cities, "store front" schools and other special education programs have been started on the initiative of community leaders to serve persons with socio-economic, ethnic, educational, or other disadvantages. These programs have mostly reflected the initiative of the community and private institutions, with little or no governmental assistance and often with no connection with the public education establishment.

CONGRESSIONAL APPROPRIATION FOR VOCATIONAL EDUCATION

Probably the most concrete evidence of support for more and better technical education lies in the 1970 fiscal year appropriation under the Vocational Education Act as amended in 1968.

The appropriation for fiscal year 1970 for the Vocational Education Amendments of 1968 totaled $376,207,455. This appropriation was over $90 million more than the amount proposed in the 1970 budget. In a year when the Congress and the Administration are cutting appropriations and holding down spending to combat inflation, an increase of 1/3 is a solid indication of the importance attributed to vocational education by both the Congress and the Nixon Administration.

A major provision of the 1968 Act stipulates that highest priorities for expenditures of grants to the States be for persons living in rural and urban areas where there is a large percentage of disadvantaged or unemployed persons. Special attention is paid to students who have dropped out of school and who need a second chance.

The Division of Vocational and Technical Education has arranged for seven national conferences to study how persons in rural areas can be provided a better opportunity for vocational and technical education. One of

the significant considerations is the need for junior colleges, technical institutes, and post-secondary area technical schools to provide or arrange for suitable housing so that students who live too far away can live at the school and have the opportunity to study the technology or specialty of their choice.

Twelve national conferences on providing vocational and technical education in large metropolitan areas are also sponsored by the Division of Vocational and Technical Education and are being held this year to provide better information and to prepare administrators at the National, State, and local levels to bring vocational and technical education to more persons in the city.

A special appropriation of $17,000,000 for disadvantaged persons is included in the fiscal year 1970 appropriation under the 1968 Amendments. These funds do not require matching with State and local funds; they should provide the special kinds of assistance required to permit students to develop their capabilities and to overcome academic and other handicaps so that they can participate in regular programs with a good expectation of successfully completing them, obtaining employment, and growing to greater responsibilities and rewards.

Post-secondary institutions can serve disadvantaged, educationally handicapped youth in an unique way. The Vocational Education Amendments of 1968 offer great potential for increased programs, opportunities, and responsibilities for public and private post-secondary educational institutions, and---especially---for community and junior colleges and technical institutes. Note the declaration of purpose in the 1968 Act, with its specific and implied mandates to provide vocational education programs and services:

> ". . .It is the purpose of this title to authorize Federal grants to States to assist them to maintain, extend, and improve existing programs of vocational education to develop new programs of vocational education and to provide part-time employment for youths who need the earnings from such employment to continue their vocational training on full-time basis, so that persons of all ages in all communities of the State--those in high school, those who have completed or discontinued their formal education and are preparing to enter the labor market, those who have already entered the labor market but need to upgrade their skills or learn new ones, those with special educational handicaps, and those in post-secondary schools--will have ready access to vocational training or retraining which is of high quality, which is realistic in the light of actual or anticipated opportunities for gainful employment, and which is suited to their needs, interests, and ability to benefit from such training."

It provides a new definition of vocational education which emphasizes "instruction related to the occupation or occupations...or instruction

necessary for students to benefit from such training..." (including field or laboratory work and remedial or related academic and technical instruction incident thereto). Federal funds under different parts of the Act require varying degrees of matching with State and local funds, ranging from dollar-for-dollar assistance for the basic programs up to 100 percent Federal funds for some other parts. Matching is statewide and not by categories as in the past. The main provisions of the 1968 Act are as follows:

Title I - Vocational Education

Part A. General Provisions and

Part B. State Vocational Education Programs

The Act provides grants to States to assist them in conducting vocational education programs. The FY 1970 appropriation for the basic program was $307,497,455. These funds are allotted to the State Board for Vocational Education in each State. The State Board administers its programs in accordance with the provision of a State Plan.

To insure the intended emphasis under the Act, significant portions of the funds are set aside for the disadvantaged, for post-secondary education, and for the handicapped. Specifically these are:

> not less than 15 percent of the funds available for State vocational education programs shall be used for the disadvantaged.
>
> not less than 15 percent of the funds available for State vocational education programs shall be used for post-secondary vocational education.
>
> not less than 10 percent of the funds available for State vocational education programs shall be used for the handicapped.

Post-secondary institutions, especially junior colleges, will be challenged to provide vocational education to:

> ". . . persons who have completed or left high school . . . . . persons . . . who have already entered the labor market who need training or retraining . . . . . persons . . . who have academic, socio-economic, or other handicaps that prevent them from succeeding in the regular vocational education program . . ."

The Act creates a National Advisory Council on Vocational Education appointed by the President. The 21 members are to be representative of various groups and interests highlighted in the Act. They will include persons having special knowledge of post-secondary and adult vocational education. One-third of the membership will be from the general public. The council will meet no less than four times a year and will advise the U. S. Commissioner of Education concerning regulations for operating

programs; it will review the administration, operation, and effectiveness of programs, and distribute results of program evaluation.

The Act also requires States to establish State Advisory Councils. Their responsibilities are similar to the national group, and they too must have a wide representation. One category of representation for State Councils includes a person or persons "representative of community colleges and other institutions of higher education, area vocational schools, technical institutes, and post-secondary or adult education agencies or institutions..."

Part C. Research and Training in Vocational Education

$1,100,000 was appropriated in FY 1970 for grants to the States to help support State research coordination units. It requires matching with State or local funds at the rate of $1 to $3 of the Federal funds. Additional funds from the basic grants to the States can be used for research grants to colleges and universities and other public agencies or contracts with private agencies, organizations, and groups. This money can be used for projects in research and training; for experimental, developmental, or pilot projects designed to meet the special vocational needs of youth--particularly those in economically depressed communities; and for dissemination of information from on-going programs and other demonstrations in the field of vocational education.

Part D. Exemplary Programs and Projects

The amendments authorize grants "... to stimulate, through Federal financial support, new ways to create a bridge between school and earning a living for young people, who are still in school, who have left school... or who are in post-secondary programs of vocational preparation, and to promote cooperation between public education and manpower agencies."

$13,000,000 were appropriated for FY 1970; 50 percent of the funds may be used for a program of grants and contracts by the Commissioner for exemplary programs and 50 percent by State boards in making grants to or contracts with local educational agencies or organizations for planning, developing, and operating exemplary occupational education programs.

Part E. Residential Vocational Education

No appropriation was made for fiscal year 1970.

Part F. Consumer and Homemaking Education

Funds are authorized for educational programs which encourage the development of home economics to promote improvements in social and cultural conditions, especially in economically depressed areas. Programs which also will receive aid are those which encourage preparation for professional leadership, prepare youth and adults for the role of homemaker or the dual role of homemaker and wage earner, offer consumer education, and are designed for persons entering the work of the home. In addition, ancillary services and activities to assure quality in all homemaking programs, such as teacher

training and supervision, curriculum development, program evaluation, and development of instructional materials, will receive assistance.

The appropriation for fiscal year 1970 was $15,000,000. At least one-third of the Federal funds shall be used for programs in economically depressed areas or areas with high rates of unemployment. Funds will be channeled to programs which will assist consumers and improve home environments and the quality of family life. The Federal share in this will be 90 percent, and in the remainder of the program, 50 percent.

Part G. Cooperative Vocational Education Programs

The Act provides grants to the States for cooperative vocational education designed to prepare students for employment through alternating work and study (co-op) arrangements. The fiscal year appropriation was $14,000,000.

This part of the Act opens a whole gamut of potential programs for specialized employment in enterprises or agencies whose environment, facilities, and work cannot adequately be simulated in schools. It permits students to work part-time on the job and at the same time pursue related study part-time in an educational institution, thus making training possible where none exists. For example, biomedical technicians may be taught in a community college or technical institute, cooperating with hospitals and procedures of biomedical equipment where the students can work for pay and learn in school in one unified program. Other possible learning for earning endeavors are: air traffic controllers, highway department technicians, water and wastewater technicians, police science and law enforcement personnel, museum technical assistants, and technical and skilled construction workers. Programs may be reimbursed with Federal funds up to 100 percent.

Part H. Work-Study Programs for Vocational Education Students

This program is an extension of the work-study provisions in existing laws, raising the Federal matching to 80 percent. It is for students aged 15 to 20 who have been accepted for enrollment as full-time students in vocational education programs. Priority is given to local educational agencies in communities having substantial numbers of youth who have dropped out of school or who are unemployed and need the earnings to continue vocational education.

The appropriation for fiscal year 1970 was $4,250,000.

Part I. Curriculum Development in Vocational and Technical Education

$880,000 was appropriated for curriculum development in fiscal year 1970. The Commissioner, after consultation with appropriate State agencies and the National Advisory Council, shall use the funds to make grants or contracts with colleges and universities, State Boards, and other organizations to promote the development of vocational education curriculum materials.

Title II - Vocational Education Leadership and Professional Development Amendment of the Higher Education Act of 1965

This Title amends the Higher Education Act of 1965 by adding provisions for vocational education leadership development. This will enable the Commissioner to give leadership development awards (stipends) to vocational education personnel for taking approved vocational education leadership development programs. Funds will include a cost-of-education payment to the institution of up to $3,500 per year.

The Act also authorizes the Commissioner to make grants to State Boards to pay the cost of cooperative arrangements for the training or retraining of vocational education personnel, including exchange of teachers with technicians in industry, in-service training, and special institutes. The Commissioner is required to give special consideration to the funding of programs which are designed to familiarize teachers with new curricular materials in vocational education.

Funds to support vocational education professional development are available through the U. S. Office of Education, Bureau of Educational Personnel Development.

PROSPECTS FOR FISCAL YEAR 1971

The level of funding for FY 1971 under the Vocational Education Amendments is projected to be at least equal to FY 1970, and if world events and national priorities permit, it may well be substantially higher.

The challenge to us as technical educators is to use the resources of the Vocational Education Amendments of 1968 to the utmost. These are exciting days for us and now is the time for redoubled efforts and action.

DYNAMICS OF TECHNICAL EDUCATION

The rapidly changing manpower needs of a civilization continually reaching higher plateaus of achievement has placed technical education in the forefront of dynamic changes in our educational spectrum. Webster's dictionary defines dynamics as

> "the driving physical, moral, or intellectual forces of any kind or the laws that relate to them."

When we analyze the forces in action, propelling the technical education movement in the United States, we find some truly amazing changes that have resulted during the past decade.

NATIONAL ADVERTISING CAMPAIGN

One of the most dynamic activities that is occurring at the present time is the national advertising campaign on behalf of technical education. Recently the National Industrial Conference Board, in cooperation with the National Advertising Council, the U. S. Office of Education, and the American Technical Education Association, organized a Technical Manpower Advisory Committee made up of knowledgeable leaders from industry and education. This committee undertook the implementation of a national multi-media advertising campaign designed for the express purpose of communicating to the American public the opportunities for young people in the field of technical

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Presentation by Jerry S. Dobrovolny, Professor and Head Department of General Engineering, University of Illinois

education. In discussing the philosophic approach to be used in the development of the various advertising media, it soon became apparent there was a need for a strong positive picture to be projected on behalf of technical education to make certain the message being communicated would clearly identify the differences between vocational education on one hand and baccalaureate education on the other hand.

Early in the discussion it was determined that there were four basic populations that needed to be addressed. These populations are the potential student of technical education, the parent, the high school guidance counselor, and the employer. The message to each of these populations has to be necessarily modified to appropriately appeal to their respective innate biases, prejudices and environmental heritages. Some of the more important facets that must be communicated to each of these population groups are directly relevant to the proposition of upgrading the public image of technical education.

The success of the campaign has been truly outstanding. In addition to the advertising material that was prepared for television, radio, newspapers, magazines, trade journals, etc. a booklet, entitled Twenty-Five Technical Careers, was published and distributed through the U. S. Office of Education. The campaign started in the summer of 1969. By October of that year the initial printing of 500,000 copies of the brochure describing the twenty-five technical careers was exhausted by persons writing to the U. S. Office of Education for copies of the booklet after hearing about the opportunities through one of the advertising media. In private conversations with officials of the National Advertising Council, it has been estimated that this is perhaps one of the most successful advertising campaigns ever conducted by the Advertising Council in the public interest category.

One of the other very important outcomes of this campaign is the forwarding of all of the requests for the booklet from the U. S. Office of Education to the individual states. The states, in turn, have been charged by the Commissioner of Education to follow up on these requests at the local level by a state effort. Many states have accepted this challenge and have done an outstanding job. I hope that all of your State Directors have followed through on this activity. I know in some states the requests were placed into boxes and stored in closets; however, I think most of these have now been found out and further follow-up work is being done at the state and local level.

The impact of this program on the technical education movement is incalculable. It is estimated that the dollar worth of the free advertising that technical education has received as a result of this campaign is somewhere in the $6,000,000 category. The National Advertising Council and the National Industrial Conference Board are to be truly congratulated for the outstanding service they are performing on behalf of technical education.

SEMANTICS

Needless to say, semantics has played an important role in the dynamics of technical education during the past ten years. After much struggle with the problem, a taxonomy has been fairly well agreed to with respect to identifying technical education as a level of education cutting across all

of the professional fields. The American Technical Education Association has truly spearheaded this movement and has made a significant contribution in the development of an articulated taxonomy that identifies technical education as a level of education. A considerable amount of work has also been done to relate this taxonomical structure with a related job function relationship.

The more recent developments, with respect to open-ended occupational education programs for our citizenry, along with the removal of the stigma of the term "terminal," have provided a motivating force for a large number of persons to seek further education and training through the technical education programs that otherwise would not have considered them. In addition to this, the two-plus-two concept in structuring four-year programs is beginning to take shape and provide a meaningful articulated movement from the two-year associate degree occupational education programs to four-year occupational programs in selected semiprofessional fields of endeavor that are not now being served by established baccalaureate programs.

THE PSYCO-STATUS SYNDROME

The American dream of becoming President is a picture that must come into the mind of every parent as he stands there and views his newly born child. Unfortunately this utopian dream too often permeates the achievement goals set forth by parents for their children with little regard for the pragmatic realities of life. It is one thing to have each person to work to his capacity, however, quite another to expect a performance of children that is beyond their capacity.

The commonly accepted concept on the part of the lay public that a bachelor's degree is an automatic and instant identification with success in our society has created great pressures on the youth of today. In many cases the only reason students enroll in college is because of the expectations of the parents. This pressure often has a negative effect upon the student regardless of his academic capability.

A recent study pointed out that a large proportion of those students dropping out of college, dropped out because of an overdependency upon the parent, not because of lack of ability. This same study reported another significant fraction dropped out because of a passive regression reaction. These kinds of psychological reactions can be traced in large measure to the home environment. Twenty percent of these students leaving baccalaureate programs for one reason or another have an I.Q. of 135 or more.

More parents are overzealous for their children to go to college. They do not realize that 80% of our youngsters do not achieve a bachelor's degree. They are also unaware of the dramatic changes that have occurred in the manpower needs of our technocracy. The need for semiprofessional technical personnel in all facets of our society must be brought to the attention of the parents. The satisfaction enjoyed by technicians, both financial as well as psychological, must be given much greater visibility.

The increased scientific knowledge in all of the professional fields has resulted in a greater fractionalization of job functions on the occupational ladder related to each of the professions. An example that

illustrates this particularly well is in the health field. The technical support personnel necessary today to assist the doctor to function to his greatest capacity has resulted in the identification of scores of occupational titles that did not exist several decades ago. Such job titles as X-ray technicians, nurses aide, licensed practical nurse, registered nurse, medical technicians, bio-medical equipment technician, nuclear medical technician, medical secretary, and a host of other job titles are part of the manpower team in the health related field.

All of these occupations require post-high school training and education. There is a great application orientation in these occupations based on a strong cognitive skill capability. Many of the preparatory programs for these job titles are quite sophisticated and can be completed in two years or less of training. Similar job identification can be made for other professional fields.

Finally more and more parents are beginning to realize the opportunities available for their youngsters in technical education. With some of the reductions in the need for professional personnel in the sciences and in engineering, as a result of the cutback in the space and defense program, more people are beginning to look to technical education programs as a vehicle for entering the job market today with a fairly high expectation in terms of job stability. There continues to be a shortage of qualified technicians in all of our professional fields. Not only the parents, but the high school students and the high school guidance counselors have started to take cognizance of the changing manpower needs and of the opportunities available in the job market as technicians.

DIVERSE TALENT INVOLVEMENT

One of the most significant hallmarks, with respect to the technical education movement, is the involvement of persons with a wide range of backgrounds working together. Very few, if any, movements have had the kind of input from so many people as are involved in technical education. At the beginning there was a handful of persons with backgrounds in vocational education and engineering education getting together to develop a common ground of understanding with respect to the development and the implementation of technical education programs. Today we have such august bodies as the American Association for the Advancement of Science, the College Commission on Physics, the Commission on the Undergraduate Program in Mathematics, the American Association of Junior Colleges, the American Society for Engineering Education, the American Vocational Association, the National Industrial Conference Board, the National Advertising Council and a host of others, all addressing themselves in one way or another to help solve the problems relating to the preparation of semiprofessional personnel identified, in the broad sense, as technicians. Throughout this interdisciplinary involvement, the American Technical Education Association has played the key role, as the unifying organization, to bring together the diversity of interests to focus upon a common goal; that being the establishment of sound technical education opportunities for the youth of our nation.

The staffing of technical education programs has resulted in a professional mix of competencies that does not exist in other fields. In the case of engineering related technologies we find graduate engineers with

years of professional experience as practicing engineers, teaching alongside persons prepared as mathematics teachers, physics teachers, chemistry teachers, social science teachers, and industrial education and vocational education teachers.

The inspiring facet of this interaction has been the devotion by those involved to meet the needs of the students by trying new things rather than taking things off-the-shelf. Teacher certification requirements have been modified in many cases to enable the hiring of those persons best qualified to teach the particular subject matter.

In many states the bringing together of people from the State Board of Vocational Education staff, the University staff from several colleges, the industrial community, and community college representatives, has resulted in communications that did not exist previously. This is not to say that everything is rosy, however, the fact that these groups are getting together for the first time is a milestone in structuring educational programs.

FLEXIBILITY

If one were to be called upon to use a word that would most appropriately identify the strength of the technical education movement, the word "flexibility" would probably be as close a word as any. Throughout the United States we find flexibility in programming, in staffing, in the initiating of new programs, phasing out of old programs, and the flexibility in the changing philosophy to meet the demands of our changing profile of our labor force. In all of this we must identify as one of the most important forces in the development of technical education the missionary zeal that those who are working in the field now possess. The fact that there are so many people with different backgrounds working in the field has provided a climate for experimentation and modification of procedures in the development of technical education programs. The unifying theme has been to serve the needs of our students so that they can appropriately assume their respective roles in society by being gainfully employed and thereby making their contributions to society.

Many new developments are occurring that are providing a sustaining force for the continuing development and thrust of technical education. New curriculums for new emerging technologies are constantly being explored. Old hide-bound barriers are being broken down to reorganize parcels of knowledge in such a way as to meet the needs for the preparation of new technicians. Such exciting fields as oceanography, bio-engineering, environmental quality control, population management, and a host of others provide the genesis for continued growth and development in the field of technical education.

RESEARCH OPPORTUNITIES

The dynamic changes that are occurring in technical education today are providing a stimulating challenge to scholars charging them with the responsibility of coming up with new answers to age-old problems of student identification, student motivation, curriculum development, manpower need studies, follow-up studies, etc. The old job analysis approach simply is inadequate for meeting our needs of the future.

Experimentation with new instructional technology is in its embryonic stages. The concept of differential staffing, the use of the master teacher, and the use of instructors from industry provides a climate for continual update and reorientation of programs in technical education. The utilization of computer aided instruction, video tape adaptations to bring into the classroom applications from industry, and the auto-tutorial programs are all in their infancy. The Electronics Technology Curriculum Development Project at the University of Illinois is investigating the use of all of these techniques in teaching electronics technology. The dissemination of the material they develop, as well as material being developed by others, will provide a thrust that will sustain the technical education movement in its ascending orbit.

CHALLENGES OF THE FUTURE

The challenges that face those of us involved in technical education for the future continue to be of a Herculean nature. A recent study by the National Industrial Conference Board indicated that the present enrollment level in existing programs of engineering technology is 60% of class capacities. That is to say we could increase the enrollment of our students in the engineering related technologies by 40% by merely filling up the existing classrooms without having to spend any additional money whatsoever for staff, laboratory facilities and buildings. The responsibility for attracting more students to our programs is incumbent upon those of us that are working in technical education. The local administrator and the classroom teacher must project the image of technical education more forcefully and more positively into their local communities.

In many areas of our country there continues to be a need for the establishment of new programs in technical education. Here again a great number of existing technologies need to be offered to a wider range of students. In addition to this we must be constantly aware of new areas of subject matter requiring the development of programs of technology to prepare technicians to work in these new fields. As indicated above, there is a constant need for program implementation, evaluation, verification and change.

One of the most important challenges that face us in the future is to develop a core of administrators in the community colleges, area vocational and technical schools, as well as colleges and universities that have a true understanding of what is meant by collegiate level occupational education. We need a series of in-service training programs for existing administrators as well as developing new preparatory programs for future administrators. Many of you who are knowledgeable in the field of technical education must begin to prepare for a greater role in the field of administration to insure a more total commitment to technical education by the various school units mentioned above.

There is still another important challenge that faces us and that is in the field of research. As indicated above, the research opportunities are almost limitless. The need for knowledgeable people in the field of technical education to do the action research required is tremendous. Here again the responsibility falls upon the shoulders of many of you that are

sitting in the audience. You must provide the leadership in the implementation of research associated with technical education. This will require new programs being established to prepare researchers in technical education. Support for these kinds of programs must be generated through the U. S. Office of Education, as well as other funding agencies both by the federal government and the various private foundations. In the field of legislation, the establishment of the various State Advisory Councils on Vocational Education and the National Advisory Council on Vocational Education provide an infinite number of opportunities for those in technical education to communicate with these various bodies to insure the appropriate emphasis being placed upon technical education. As you all know the State Advisory Councils are charged with the responsibility of evaluating the effectiveness of the programs being funded under the amendments of the Vocational Education Act of 1968. It is the responsibility of those of you who are in technical education to not only cooperate with the State Advisory Councils, in developing the kinds of data that are required for program evaluation, but to also communicate with the State Advisory Council in terms of suggesting the kinds of priorities that are relevant in your respective states from the standpoint of the preparation of technical manpower.

In closing, I charge all of you to continue your missionary work and go back to your respective communities and attack with new and greater vigor the problems that are facing us with respect to total implementation of technical education in the United States.

TRAINING TECHNICIANS IN ALLIED HEALTH POST-SECONDARY PROGRAMS

It is a pleasure to participate in this National Clinic on Technical Education, and to give special attention to the subject of "Training Technicians in Allied Health Post-Secondary Programs."

There is really no point to over-education; allied health exists because patients need many services which do not require the ten years of education it takes to prepare physicians. From a purely economic standpoint, we need the least trained person who can perform a particular function properly. Perhaps the triangle, or pyramid, best depicts what we need in allied health, with the base representing entry-level jobs for high school graduates introduced to allied health occupations by a few weeks or months of post-high school education; many of these people start work as aides. In addition to this large base of entry-level workers, there is a need for more formally educated workers who are prepared to perform specific, special tasks delegated to them. These workers might have one or two years of higher education (lower division of senior college or junior college), and might be called technicians or assistants. A smaller number of even more highly trained allied health workers is needed to accept responsibility for procedures which do not require the skills and knowledge of a physician. The point at the top of the triangle or pyramid is the few at the doctorate

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Presentation by Ralph C. Kuhli, M.P.H., Director, Department of Allied Medical Professions and Services, Division of Medical Education, American Medical Association

level. The physician should do what only the physician can do. There are 13 or 14 health workers for each practicing physician. We need all levels of health workers; we need many Indians as well as Chiefs!

Vocational and technical education for the allied health occupations is taking place in all kinds of settings, including hospitals and laboratories, universities, four-year colleges, junior or community colleges, vocational schools, technical institutes, high schools, proprietary schools, and military schools for medics. The Division of Vocational and Technical Education reports that enrollments in health occupations education more than doubled from 1964 to 1968; from 59,006 students in 1964 to 140,987 in 1968.

The Council on Medical Education of the American Medical Association and fourteen collaborating organizations are interested in doing all they can to help make this education good enough without over-education. The way we do this is to cooperate in developing better answers to two simple questions:

1. What do you think is essential in a good educational program for a particular allied health occupation?

2. Where are such educational programs being taught?

We have adopted a standard format for the revision of our Essentials for approved educational programs for some of the most important allied medical occupations. This standard format includes provisions enabling technical and proprietary schools which have allied health educational programs to have them accredited by the AMA Council on Medical Education and the fourteen other national professional health organizations collaborating with the AMA. We propose to involve appropriate national professional associations representing education in the process of revising existing Essentials to the new standard format. Our answers to questions on what we think is essential are brief outlines, which we refer to as "Essentials."

The head of any institution conducting educational programs which meet or exceed these Essentials may request AMA approval. We provide checklists for self-evaluation. Review Committees composed of representatives of collaborating organizations and the AMA send survey teams to make site visits, and approved educational programs are listed in a Directory of Accredited Allied Medical Educational Programs.

Since the objective of all this is to develop appropriate quality in educational programs, one of the interests of the AMA and the collaborating organizations is in new, different ways of doing a job. If we didn't have a national system for cooperating with innovators, recognizing all kinds of effective teaching, and accepting graduates of various kinds of educational programs, the experimenter might risk the immediate future of the students of new and different kinds of educational programs. Therefore, we are giving special attention to the encouragement of experimentation and innovation in educational programs, and the accreditation process is being used to give security to the innovator and his students. One way to obtain this service is for the educator who is planning a new, different kind of educational program to write us a short letter requesting national consideration for the innovation. The organizational machinery is increasingly responsive to such requests. Here is how it works.

In the 1930's, the AMA Council on Medical Education and Hospitals was asked to join forces with other national medical specialty and allied health organizations specifically concerned to accredit educational programs for several occupations closely allied to physicians in the delivery of medical services to patients. During the following decades the lists grew until now fifteen national professional organizations are collaborating:

American Academy of Orthopaedic Surgeons
American Association for Inhalation Therapy
American Association of Medical Assistants
American Association of Medical Record Librarians
American College of Chest Physicians
American College of Radiology
American Medical Association
American Occupational Therapy Association
American Physical Therapy Association
American Society of Anesthesiologists
American Society of Clinical Pathologists
American Society of Medical Technologists
American Society of Radiologic Technologists
Society of Nuclear Medical Technologists
Society of Nuclear Medicine

They are concerned with the following key allied health occupations:

Certified Laboratory Assistant
Cytotechnologist
Histologic Technician
Inhalation Therapy Technician
Medical Assistant
Medical Record Librarian
Medical Record Technician
Medical Technologist
Nuclear Medicine Technician
Nuclear Medicine Technologist
Occupational Therapist
Orthopaedic Assistant
Physical Therapist
Radiation Therapy Technologist
Radiologic Technologist

AMA staff work on these occupations is divided among four Assistant Directors of the Department of Allied Medical Professions and Services:

Radiation. Warren G. Ball, D.D.S., is responsible for AMA staff services for the education of

Nuclear Medicine Technician
Nuclear Medicine Technologist
Orthopaedic Assistant
Radiation Therapy Technologist
Radiologic Technologist

Laboratory. William R. Bishop, Ph.D., Has AMA staff responsibility for educational programs concerning:

Certified Laboratory Assistant
Cytotechnologist
Histologic Technician
Medical Technologist

Administration. John J. Fauser, Ph.D., Represents the AMA in staff work for education for occupations allied with the pediatrician and:

Medical Assistant
Medical Record Librarian
Medical Record Technician

Therapy. An incoming Ph.D., will have responsibility for AMA staff services for the education of:

Inhalation Therapist
Occupational Therapist
Physical Therapist

In each case, the Assistant Director works with national Review Committees. Dr. Ball is working with a Joint Review Committee on Education in Radiologic Technology, and the Joint Review Committee on Educational Programs in Nuclear Medicine Technology; Dr. Bishop is working with a Board of Schools of the American Society of Clinical Pathologists (a Board which is soon expected to become a Joint Review Committee cosponsored by the American Society of Medical Technologists and other national professional organizations); Dr. Fauser is working with the Approval Committee of the American Association of Medical Assistants and the Education and Registration Committee of the American Medical Record Association; and the incoming Ph.D. will work with the new Joint Review Committee on Inhalation Therapy Education, the Accreditation Committee of the American Occupational Therapy Association, and the Committee on Basic Education of the American Physical Therapy Association.

The director of an educational program which does not fit our existing pattern is encouraged to write directly to the chairman of the appropriate review committee or to the AMA staff man concerned. Meetings of the committees are frequent, and the work continues between meetings. Two of the possible actions are:

1. Revise Essentials. Perhaps the need is to revise the essentials. The subject can be put on the agenda for the next meeting of the Committee concerned. If they draft a revision in the Essentials, this can be approved by the governing bodies of the collaborating organizations and the revision sent to the AMA. The revision may be received by the Advisory Committee on Education for the Allied Health Professions and Services, recommended to the Council on Medical Education, and reported to the AMA House of Delegates with a recommendation for adoption. By the way, the House meets every six months, so action can be prompt and responsive.

2. Endorse Experimentation. A different kind of action might be consideration of an entirely new kind of educational approach. The Committee concerned might ask for enough information so that the members can understand and assess the plan to estimate whether graduates will be prepared to do the tasks required for the particular allied health occupation. In some cases, the Chairman could invite the innovator to meet with the Committee to discuss the proposal and come to some agreement on national professional acceptance of the graduates.

One predominating characteristic of the national professional health organizations concerned is that they are for change; they say: Do a better job, and do it in as short a time as possible. This national interest and support gives security to the innovator, who can discuss his plans with his peers and have their understanding and cooperation in developing new and better ways to prepare people to work in the health occupations.

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Now I would like to comment briefly on a number of subjects of interest to all concerned with technical education.

A. Entry-Level Jobs. Practicing physicians believe in hiring good people who are willing to learn and to work at entry-level jobs. Doctors hire Medical Assistants to work in their offices, where they learn to be increasingly useful in helping the physician provide medical services to patients. Note that a license is not required to work under the direction and supervision of a licensed physician in providing services to his patients. The AMA works very closely with the American Association of Medical Assistants, and this allied health occupational group is especially highly regarded by practicing physicians. Physicians hire some high school graduates and give them all their training on the job. Any appropriate post-high school education and experience could develop additional qualifications for employment as a Medical Assistant. In the State of Washington, former military medical or hospital corpsmen are given three months of additional higher education at the University of Washington and fifteen months of supervised clinical experience; then they are hired as medical assistants in a program called MEDEX -- a contraction for "Medical Extension." I feel sure that much of the opposition to the words "Physician's Assistant" would disappear if the word "Physician" was replaced with the name of a medical specialty or just the general word "Medical." As I said, any amount of helpful education is welcome, but at the present time we ask directors of medical assistant programs to be approved by the AMA to offer two years of post-high school education.

B. Technical Education. The physician is concerned with the total medical care of the patient as a person. So is the nurse. And so, too, are the Medical Assistants providing clinical services, and

the men working in programs such as the MEDEX care in rural areas in the State of Washington. Patients also need many kinds of specialized technical services which can be provided by a technician who has had a year or two of specialized training. Physicians are the first to say that competent allied health workers -- who have had special training and extensive supervised experience -- can do their special tasks better than the physician. So the patient gets better service for less money, because the technician with perhaps two years of higher education should not be paid as much money as the technologist with four years or the physician with twelve years of higher education. If we accept the round figures that there are about 250,000 practicing physicians and a total of about three and a half million other health workers, then for each physician there are fourteen other health workers. By the way, it would help if we could agree on the use of the words technician or assistant to identify someone who has had up to two years of higher education to prepare him for the job.

C. Kinds of Institutions. For many decades hospitals have accepted the chores of recruiting the best possible people to allied health educational programs and of providing the education. This is still going on, of course: we should all be grateful to hospitals and hospital associations for their active and effective support of the Health Career recruitment programs, and most of the 2,500 allied medical educational programs now accredited by the AMA are conducted by hospitals. Of course, hospitals should continue and, in fact, expand their clinical instruction for students from institutions of higher education. During the past two decades we have seen a dramatic expansion of allied health educational programs in colleges, which enroll the students, teach the didactic portions of the educational program, contract with hospitals for the clinical portions of the educational program, and grant the academic credit and degrees which are earned. The American Association of Junior Colleges tells us that about 900 of the 1,050 junior colleges are offering one or more educational programs for health occupations, and the Association of Schools of Allied Health Professions is currently inventorying the allied health programs in four-year colleges and in universities, which already have more than 70 schools of allied health (or health related) professions. The U. S. Commissioner of Education has recognized the National Association of Trade and Technical Schools and the Accrediting Bureau of the American Medical Technologists to accredit certain allied health educational programs in technical and proprietary schools -- a fact from which I can only avert my eyes, although we are heartily in favor of proprietary schools offering educational programs which are of the necessary quality. The AMA Council on Medical Education has formally agreed that its concern is only that the educational program be of the necessary quality, and the Council has directed AMA staff and requested the collaborating organizations to work diligently for AMA review of proprietary schools.

D. Support for Government. The Executive Branch of the United States Government includes several major programs for allied medical

education, and the AMA works for effective support of appropriate federal programs.

U. S. Department of Defense. The Air Force, Army, and Navy conduct intensive educational programs for military medics and the medics earn an impressive reputation in their military experience. In addition to accrediting more military schools, the AMA also seeks to learn how we can use the military precedent to shorten civilian educational programs and is now engaged in a major national program to encourage hospitals to hire discharged military medics. The Veterans Administration conducts what is perhaps the largest allied health educational program in the country.

U. S. Department of Health, Education, and Welfare. The Office of Education is providing major assistance through its Division of Vocational and Technical Education and its unit concerned with Accreditation, and AMA support for this work is sure to become increasingly effective. The National Institutes of Health have a Bureau of Health Professions Education and Manpower Training, with a Division of Allied Health Manpower which has provided specific and substantial federal support for allied health education.

U. S. Department of Labor. The Bureau of Labor Statistics has been especially active and helpful in standardizing terminology for allied health occupations in publications such as the Occupational Outlook Handbook. I understand their monumental Health Careers Guidebook is being revised. There is a great need for more Labor Department participation and leadership on job analyses and -- in cooperation with the hospital people and others concerned -- listing the exact tasks which each allied health occupation is required to be able to do.

The AMA Council on Medical Education and its Advisory Committee on Education for the Allied Health Professions and Services with a Panel of Consultants is especially interested in increasing effective support for appropriate federal programs for allied health education. Not the least of our interest is full funding.

E. Systematic Procedure. We should all resist the temptation to start with education when we consider an allied health occupation -- especially a new occupation. There are five other steps which really should come first:

1. What services are needed by the patient?

2. How can these services be provided most effectively? (Maybe the system of the equipment can be improved: all problems are not solved by additional people.)

3. Can the people in existing health occupations provide these services most efficiently?

4. If not, what new allied health occupation is needed?

5. What, exactly, are the tasks which this new allied health occupation will be expected to perform? (Here we are talking about performance standards.)

6. What educational program is needed to develop the proficiency necessary to perform these tasks?

The AMA Council on Health Manpower has developed "Guidelines for the Development of a New Health Occupation" which have been adopted by the AMA House of Delegates and are available for the guidance of anyone interested in the development of a new health occupation.

F. Operational Imperatives. There are a few actions which I would hope that each of us concerned with allied medical education would consider:

1. Be sure you are receiving the monthly Allied Medical Education Newsletter, and use it as one channel of communication to others concerned. Just send your news items to Mrs. Linn Meyer, Editorial Assistant, Department of Allied Medical Professions and Services at the AMA.

2. If you are directing an educational program for an occupation in the list of fifteen approved by the AMA, be sure the educational program is included in the AMA Directory of Accredited Allied Medical Educational Programs. If it isn't, a letter to us at the AMA could be the first step.

3. If you have a problem or an idea concerning AMA accreditation, direct your energies toward using the existing organizational machinery to solve the problem and consider -- let's hope, implement -- your idea. The first step is probably a letter from you to your own national organization, to the chairman of the appropriate Joint Review Committee, or to one of us in the AMA Department of Allied Medical Professions and Services.

4. Orient yourself toward our objectives, rather than the problems which frustrated us in the past. Let's keep our eyes on solutions to problems, and realize that probably our greatest difficulty is just the work which is before us.

G. Delegation. Physicians want to delegate more tasks to the other members of the medical care team. The doctors need to know that the other health professionals have had the education required to develop the proficiency necessary to do these tasks correctly. The standards are set by the Golden Rule: what quality of service do you want when you are a patient?

* * *

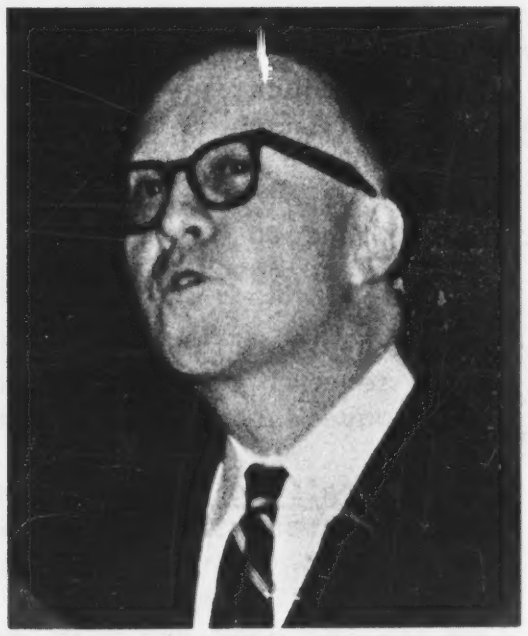
All of us have known what it feels like to be frustrated. But we cannot continue to say that "They" won't let us, because now it is up to us;

and together, we can do what needs to be done. We are living in the present and working for the future. Instead of reciting the litany of past problems, let us work together on the big job we have before us.

The reason for this National Conference on Technical Education is to get better organized so we can solve our respective problems more efficiently. One way to accomplish this is by innovation, and another is to benefit from diversity. Both of these can be facilitated by accreditation.

Not far from here are the launch pads for our space rocketry, which must surely include the most elaborate health maintenance program in history. A health team provides for the safety and the health of the 54 astronauts now involved in the Apollo series of flights. There are four doctors among these astronauts, and one is expected to be a member of each crew manning a future orbiting laboratory in space. This skylab dramatizes the increasing emphasis on health maintenance by teamwork, with major emphasis on biomedical instrument technology and technicians.

A health team includes a variety of professional and technical workers. It takes the right education for them to learn to do the job properly, and manpower priorities require technicians to have enough post-secondary training without over-education. That is our responsibility, and our opportunity.



RESEARCH IN TECHNICAL EDUCATION
DEVELOPMENT OF GENERALIZABLE EDUCATIONAL PROGRAMS
IN EMERGING TECHNOLOGIES

Research, like other aspects of technical education, is changing rapidly in response to the needs of the changing world. A most important development is the emergence of a new type of research in technical education which supplements the traditional research study project.

Traditionally, the research study has been conducted by one or two researchers and has been addressed to a relatively narrow educational problem. The common method of dissemination has been the ERIC system. The Final Research Reports are sometimes used by other researchers but are seldom utilized by technical educators generally to bring about major changes in technical education programs.

This kind of traditional research study is, of course, <u>important</u>. Through it, we can learn much about the basics of technical education. However, it is not surprising that some people have questioned the value of such research when so little impact upon the main stream of technical education can be documented.

Recently, a new type of research program has begun to develop alongside the traditional research study project. These new research programs have as

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Presentation by Arthur Nelson, President, Technical Education Research Center, Cambridge, Massachusetts.

yet no generally recognized name. They are sometimes called "applied research" programs or "action oriented" research programs. They differ, however, in several significant ways from the traditional research projects in technical education--in their purpose; in their programming; in their staffing; and in their approach to dissemination.

-Their purpose or objective is not primarily to produce a research report but rather to help produce action--to help schools throughout the country to develop new programs and to teach more effectively.

-Their programming is usually multiphased, with continuity extending over several years, and utilizing systems planning techniques to plan and coordinate multi-disciplinary research activities.

-Their staffing pattern is usually not that of a single Principal Investigator with a graduate student or two to help him but rather that of an interdisciplinary research team including individuals with many different backgrounds and talents; working closely with schools on the one hand and with employers on the other. Components of the research team may be located in several different parts of the country.

-Their approach to dissemination is not simply to distribute a Final Report when the project is completed but rather to view dissemination as a continuous process of interaction which begins on the first day of the program and runs throughout. It has the conscious purpose of involving interested schools, educators, employers, students, and others throughout the country in the program and of encouraging the diffusion, implementation, and transplantation of the findings of the research to schools and, in turn, utilizing the feedback from schools to further improve the research results.

Although Technical Education Research Center (TERC), an independent, non-profit, public service corporation of national scope is interested in several areas of action research, I will focus primarily on TERC's programs in the emerging technologies. These are our oldest and largest programs and illustrate well this new action approach to technical education research. These programs are generalizable to many areas and to many schools. They are on the cutting edge of educational innovation in our increasingly technological society.

1. Program Relevance. Development of post-secondary educational programs in emerging technologies is critical for a rapidly changing technological society. There are today ten to twenty important "emerging technologies," including Bio-Medical Equipment Technology, Electro-Mechanical Technology, Electro-Optical Technology, Marine Technology, and Environmental Management Technology, to mention only a few.

   In each of these emerging technologies, there are typically existing unmet needs for from five to twenty thousand trained technicians, representing a national requirement for 50 - 100 schools to establish programs in each technology in the next few years.

An adequate supply of technicians is critical to the growth and development of each of these new technologies. Each technician trained will in turn provide employment opportunities for from two to ten skilled workers in these new technologies.

Because of the rapid growth nature of these emerging technologies, the employment opportunities for trained personnel and the need for educational programs are growing much faster than in older and more established fields. These new technologies will become major employers of technicians during the 1970's.

In each emerging technology, employment opportunities exist and are developing at many different levels of skills and abilities. Many of these represent realistic employment opportunities for disadvantaged individuals.

Careers in emerging technologies are particularly attractive to students. They offer students realistic "ground floor" opportunities for rapid individual growth; importance to the community; membership on professional, technical and management teams; satisfying compensation and rapid promotion; and a foundation for continued higher education in the technology. Students see these careers as "where the action is."

Career education programs in emerging technologies are therefore particularly appropriate to community/junior colleges and technical institutes. In addition to providing students with unusually attractive career opportunities, such programs give leadership and prestige to the college by demonstrating that the college is responsive to the community's increasing need for technical personnel and is thereby contributing substantially to the economic growth of its community.

Despite the many real and growing career opportunities and the community need for programs in emerging technologies, the diffuse and fragmented nature of each emerging technology presents a confused and uncertain picture to youth, to parents and to schools. Because of these unfamiliar requirements and the lack of instructional materials and trained teachers, few schools to date have established programs in emerging technologies.

A basic reason for this is that it is seldom feasible or economical for individual schools or even individual states to carry out the extensive and expensive research and development necessary to develop such programs initially, and to maintain their relevance to rapidly changing needs and opportunities. There is indeed seldom the know-how in any one community or state to adequately encompass all aspects of the new technology.

Because of the undeveloped, dispersed, and rapidly changing nature of emerging technologies, the development and maintenance of adequate educational programs can be most effectively and economically facilitated by a nationally coordinated research and demonstration effort capable of approaching each technology systematically

with regard to the essentials of occupational analysis, instructional objectives, curriculum and program planning materials, teacher training, and student counseling.

In order to address this urgent national problem effectively, TERC undertook, beginning in 1966, the first of a series of research and demonstration projects in emerging technologies. These projects undertaken with the sponsorship of the Bureau of Research of the U. S. Office of Education (now the National Center for Educational Research and Development), have the objectives of developing generalizable educational programs in four specific emerging technologies.

Bio-Medical Equipment Technology--"The BMET Program"

Electro-Mechanical Technology--"The EMT Program"

Nuclear Medical Technology--"The NMT Program"

Laser and Electro-Optical Technology--"The EOT Program"

2. Program Objectives. The overall objectives of these projects are:

To help alleviate the increasingly serious shortage of technically trained personnel within these emerging technologies.

To contribute significantly to the development of new career opportunities for thousands of individuals including educationally disadvantaged, but basically able, young people.

To form a prototype of procedures for the development of generalizable curricula for other emerging technologies.

Each of the four research projects is in essence a coordinated national effort to assist schools to develop and implement educational programs in new fields where urgent needs and opportunities exist, but where the instructional materials, teachers, and experience normally available for new program development in schools do not exist (and without such coordinated programs, will not exist for many years). These projects are specifically designed to assist community/junior colleges, technical institutes, and other schools throughout the country to match their career education programs more closely to the rapidly changing needs of the relevant technology efficiently and economically and with a minimum of local time, cost and effort.

3. Program Common Features and Characteristics. Although each of the four research projects focuses on a different technology and involves a different mix of technical subject matter, the research methodology and procedures which TERC is employing on all of these projects have many commonalities. Each of the projects shares the following common characteristics and features:

Each is based upon careful occupational analysis of the developing needs of employers within the emerging technology for technicians

and upon careful analysis of the capabilities and interests of schools to establish programs in the technology.

Each project falls naturally into four major phases extending over at least four years: Phase I - Occupational Analysis; Phase II - Curriculum Planning; Phase III - Detailed Curriculum Development and Testing; Phase IV - Dissemination and Implementation.

Each project deeply involves relevant employers, professional groups, governmental agencies, educational institutions, scientists, teachers and students in many parts of the country in all aspects of the program development, revision and maintenance process. This facilitates the general acceptance and diffusion of the program to schools and industry. Each of the four TERC projects is expected to lead to the development of new educational programs in more than one hundred schools and to the development of new career opportunities for tens of thousands of individuals.

Each project seeks to encourage the development, within its emerging technology, of a rational, soundly-based and generally accepted educational and career ladder which will provide career opportunities for individuals with many different backgrounds and levels of ability.

Each project is sensitive to the needs of a broad spectrum of individuals, and, through pre-technical programs, seeks to permit individuals of all backgrounds including disadvantaged individuals to obtain employment and to pursue open-ended careers within these emerging technologies.

Each project seeks to provide particular opportunities for economic and social escalation to disadvantaged individuals. For example, 78% of the students being trained in an emerging technology in one pilot school came from families earning less than $5,000 per year; and more than 50% came from families earning less than $3,000 per year. The typical technician graduate from a two-year emerging technology program at this school will immediately command a better paying job than his father after a lifetime of work.

Each project facilitates the establishment and works closely with pilot demonstration programs in several leading community-junior colleges and technical institutes throughout the country. These programs are designed to be generalizable to the nation and may be adapted to be sensitive to the needs of any given community. Each of the pilot schools involved in the project typically provides substantial local contributions and intends to maintain its program on a continuing and self-supporting basis after the federally supported project is completed. TERC works with schools throughout the country through its seven regional offices.

Each project seeks to greatly accelerate the normal dissemination process by actively assisting a large number and variety of schools throughout the country to establish needed educational programs in each new technology.

Each project seeks to establish within its technology an on-going, self supporting mechanism for continued curricular change and renewal after completion of the federally supported research project. This mechanism incorporates the cooperative efforts of employers, professional societies, educational institutions, and governmental agencies who are interested in each of the emerging technologies in what we call an Interactive Network.

The educational and economic significance of each of these projects is being recognized by the pilot schools, employers, and professional societies cooperating with TERC. Local and industrial contributions to these projects are far exceeding anticipations and are providing a substantial degree of matching of Federal expenditures. Employers have been particularly generous in contributing laboratory equipment to these programs for use in those schools which establish programs in emerging technologies - under the TERC Laboratory Equipment Assistance (LEAP) Program.

A major result of the four TERC projects in emerging technologies has been and continues to be the development and refinement of new specialized techniques and procedures which are applicable directly to the development of generalizable educational programs in other emerging technologies.

These include:

Techniques and procedures for occupational analysis in emerging technologies.

Techniques and procedures for school surveys.

Techniques and procedures for curriculum development in emerging technologies.

Techniques and procedures for pilot testing and evaluation of programs in cooperating pilot schools.

Techniques and procedures for involving employers, professional societies, industrial experts and others in the programs and in making the programs generally acceptable.

Techniques and procedures for dissemination of the programs for use in many schools.

Techniques and procedures for career guidance in emerging technologies.

Techniques and procedures for teacher training in emerging technologies.

It is expected that these specialized techniques and procedures which are being developed in connection with the four present TERC projects will be utilized in developing similar programs in additional emerging technologies where urgent and growing national needs for technicians exist and where few if

any educational programs now exist or are likely to exist for many years without such a coordinated research effort.

So much for a broad outline of the relevance, objectives, and common characteristics of these new programs. Now, a few general observations about this kind of action research program based upon TERC's experience to date:

> Such programs can seldom be carried out economically by a school alone.
>
> They can seldom be carried out effectively by researchers alone.
>
> They are of limited value if carried out by researchers working with one school alone.
>
> This kind of action research requires the development of an effective working partnership between a research organization and a number of schools who are willing to devote real effort over a period of several years. Such programs also require the continuing active cooperation of interested employers, professional societies, universities, scientists and engineers, and students throughout the country.
>
> This kind of action research cannot be part-time effort or a start and stop effort. It must be conducted on the basis of at least a three to four year plan in order to develop a staff with the necessary special skills to handle the many different tasks involved. These programs take time and a lot of work. But the results, we feel sure, will be real and significant.

Now let me say a word about TERC and you. As I have said, TERC's basic philosophy is that these research programs are good only to the extent that they help schools--that they are used by schools. If you, as an educator, are interested in establishing or improving programs in new technologies in your school -- either those technologies described this afternoon or others, TERC wants to work with you and with your school. If you, as an employer, are interested in seeing programs in new technologies established in schools in your area and are willing to help get them established, TERC wants to work with you and with your company. TERC has much to offer both schools and employers -- by way of program planning materials, curricula, and instructional materials. You have much to offer TERC by way of experience, planning inputs, program testing, and dissemination.

I would encourage each of you who would like to be active in the development of programs in emerging technologies to get in touch with TERC either at its Headquarters, 44A Brattle Street, Cambridge, Massachusetts or at one of TERC's seven regional offices in Los Angeles; Milwaukee; Springfield (Mass.), Stillwater, Oklahoma; Urbana, Illinois; Waco, Texas; and Washington, D.C. In a broader sense, I encourage you to think of TERC as a mechanism--your mechanism--through which you can do things in terms of new programs which otherwise would be difficult or impossible.

As I said in addressing the ATEA Annual Meeting in Denver in December 1966 when the broad concept of these programs was first publicly announced--TERC can justify its existence in only <u>one</u> way -- by being of <u>real</u> service to you -- the technical educators of the United States and the world.

CO-OP PROGRAMS IN OCCUPATIONAL EDUCATION

The idea and the application of the cooperative approach to education is not new. There is an old saying that if you are selling newspapers on a corner and not doing too well you have two courses of action to follow, you may try shouting a little louder or move to another corner.

I believe that those of us in occupational education occasionally have recognized that some folks felt we were not selling too many papers. We tried shouting a little louder and perhaps that has helped some, but I'm pretty sure, and I believe you are too, that someone has told us to move to that other corner now.

I will not presume to tell you how to develop, or conduct educational programs using the cooperative approach. Hopefully, I will rekindle some interest and perhaps stimulate some of you to take another look at what might be done with some rethinking and redoing or (please excuse the expression) giving birth to an entirely new program using the idea of cooperation in education with the occupational community.

The 1968 Amendments have in all probability released more energy and effort on the part of vocational-technical educators in this country in the last year than has been released in the last ten years. My being here today is an indication of the efforts being made in one area of education, an approach to teaching called cooperation education.

Presentation by Louise C. Egan, Consultant, Florida State Department of Education.

Assuming that you are aware of the implications of the 1968 Amendments of the Vocational Education Act of 1963, and the effect they have exerted upon occupational education to date; and that you are aware of the emphasis placed upon cooperative education as an approach to occupational education programs (as written in the Amendments), I will confine my remarks to some general observations as they relate to cooperative education and to some specific points as they relate to health occupation education. (A program area in which I have had some small experience).

Mr. Joe K. Taylor, Administrator of the new Northside Hospital in Atlanta, Georgia, recently conducted a study to determine who or what influenced three hundred and eighty-four young people, enrolled in the nursing programs of that city, to choose nursing as a career. His survey indicates that nurses currently in the occupation had the greatest influence on the student's choice of occupation. Following in close order as contributing factor in career choice was work experience in a clinical setting. A third factor, in the order of greatest influence, was personal experience with illness of self, family or friends. Low on the list were such things as recruitment films and brochures. School counselors also played a minor role in decision making for nursing students.

As a matter of some interest, Mr. Taylor's study also indicated that, although the majority of the students were sixteen years of age when they made their decision, the next greatest number were between four and nine years of age when an indication of career choice was first directed toward nursing.

This example of the data being compiled relative to youth making decisions about occupations is just one of many such studies now underway and being added to the many studies that have been completed over the years. From the information gleaned from such studies we must learn and should modify our thinking about student recruitment, grade placement, and curriculum development of occupational education.

As I am sure you know, health occupations education programs for many years were using a modified cooperative education approach, (we called the pay to the students "stipends"). Classes were taught in the skills and related subjects and then, with a limited amount of supervision by the teacher, the students were released to the employer to furnish the "fringe learnings" through actual work with patients. Something happened here that you may want to remember, and hopefully avoid. We began to find the employer assuming all of the student's learning time to provide the services for which they were paid a relatively small amount of money. Some of you, I am sure, recognize some other occupational education programs as I mention this particular point. Gradually through legal agencies, such as a State Board of Nursing, exploitation of students was and still is being eliminated from educational programs for nurses. Some of our other health occupation programs have not yet reached the distinction of being called strictly educational programs, but we are working on it. Educators in health occupation education therefore may have some reluctance to consider the cooperative approach in teaching in that particular field. I wish to emphasize at this time, however, that health occupation education programs wherever advisable, should be evaluated for the possibility of such an approach to teaching.

Some, by nature of the occupation itself, may not be adapted to the cooperative education method. However, some types of programs lend themselves to this approach.

May I share with you an experience we in Florida have had in the area of cooperative education in health occupation education programs.

For the past two years we have had a group of teachers, who happen to be registered nurses, teaching a program called Cooperative Health Occupations within secondary education institutions. I would like to tell you a little about those programs, but first let me give you some background information. There are those of us who are deeply concerned that in spite of extensive recruiting efforts, such as career days, films, brochures and speeches, we have not been able to entice the youth of this country, and I might add, state, to enter health fields in appreciable numbers to meet the demand for prepared workers.

For many years, as long as we have had a form of diversified cooperative education, we have had some students who indicated an interest in nursing or some other form of health occupation. These students were shuttled through the related instruction and then placed on-the-job as a nurse aide. In all fairness to the wonderful DCT coordinators, we had <u>some</u> success in getting these youngsters into health occupations, or were we successful because of the nurses the students met on the job, or the fringe learnings from actual experience? I refer you back to Mr. Taylor's study. Recently we have found that more young women and young men are considering the field of health when seeking an occupation. We are sure the expansion of the health field itself has had some effect on this.

There are more occupations to consider than the previous two old standards of medicine and nursing.

There are close to 250 health related occupations listed in the <u>Dictionary of Occupational Titles</u>. As you can see, numbers of occupations alone would prevent establishing a program for each occupation because of cost and the recruitment of students would be a problem.

In an attempt to find a solution to the problems stated above, three high school programs of <u>Cooperative Health Occupations</u> were established in September 1968, in Miami. To date, there are twelve such programs in the county. Requests have been received for several more.

Included in the program, which has to date been presented to high school seniors, are such subjects as gross anatomy, medical and dental terminology, human relationships, a survey of health service occupations and a cluster of skills basic to the majority of health service occupations. The purpose of the program is three-fold:

1. To provide an opportunity for the student to obtain basic skills and knowledge needed to enter a first level job within the health service field.

2. To offer to the student a "first hand" opportunity to evaluate his state career choice and to alter it if he wishes while he can still obtain teacher assistance and guidance.

3. To suggest to students that education is continuous and that opportunities for promotion and other forms of compensation are available by increasing knowledge and skill through other education programs.

As we investigate, seeking assistance or information from other states, we find that similar programs are being attempted in several states but that no nationwide effort has been made to develop programs in cooperative health occupations except those that traditionally have been adult programs and are modified to fit the typical high school or other school schedule.

May we suggest to you that the modification or retreading of traditional programs has not always worked. The persons objecting to health occupation education being taught in programs that have developed in this manner may have been justified in stating that the programs do not have the quality needed to prepare workers to perform in the work situation at an acceptable level.

It is my opinion, the situation calls for a new look at the old problem.

At the high school level, as well as at all post-high school levels, our primary objective is to prepare the individual for employment. We need, however, to be honest not only with the student and the employer but with ourselves and say that we can prepare the individual for an entry level job only.

This statement particularly applies to cooperative education.

Participating in a planned program of systematic occupational experiences under the supervision of concerned and committed teachers provides the students with basic "learnings" and valuable experiences which are often unobtainable in other manners. Such participation may not, however, prepare a student completely for entry level into an occupation.

To refer once more to the need to occasionally break with tradition, I cite another example of just such activity with the teaching of physically handicapped workers in the health field using the cooperative education approach.

Working with the Vocational Rehabilitation District Office in Pensacola, the Pensacola Junior College established a program in diversified health occupations for those persons who had been recipients of monies from both welfare and vocational rehabilitation for a period of time and who were unable to find or hold a job. All of these persons were diagnosed as having some form of emotional "anxiety" and several had physical handicaps as well. A program was established and conducted to meet the needs of the individuals seeking the educational preparation needed to find employment. Wanting to meet the need of the student for employment we used the cooperative approach. Individual and group counseling was part of the program, as were the basic skill and knowledge needed to enter into an assistant type occupation in

several health agencies in the community. Special class activities were included because of therapeutic value. One of these was typing. Although few students would become expert typists or even seek employment in this area, typing was included since it provides an opportunity for instant success. A button is pushed and a letter appears immediately. Our students needed success of <u>any</u> kind. Failure had been following them for many years and had in fact contributed to their present condition. After a period of classroom activities and counseling, the students were placed in the health agencies. Employers knew the limitations of each student as well as their ability to perform in specific tasks at a specific period in the program. Several similar programs are now functioning in Florida.

We have been most successful, I believe, in this area of cooperative education in health occupations, even though we have really just started.

We note a change of attitude on the part of most of the graduates of the program toward work in general. Although we have not had all of the students placed in full-time employment, the <u>majority</u> are employed, some for the first time, some for a period of time longer than in the past. Another profit from this endeavor has been to see the change in attitudes of employers toward the employability of the handicapped. I might add it gave some educators a change of viewpoint about vocational rehabilitation counselors also as the two, education and rehabilitation, worked together.

I have used these examples to illustrate some of the value of the cooperative education approach.

If I may I would like to discuss briefly some of these points of value.

THE VALUE OF COOPERATIVE EDUCATION APPROACH

1. A cooperative program can be designed to meet the needs of all levels of student learning ability.

   The slow learner as well as the student with "above average" ability may gain from the cooperative method of teaching occupational education. Programs can be designed to meet needs of the student as well as the needs of the employer to fill jobs for which there are no formal educational programs or a justification to establish formal traditional programs.

2. Utilizing the cooperative approach involves not only the student and teacher in a more direct manner in the development of a meaningful course of study, but also involves members of the community outside the traditional educational circle in providing learning experiences for present and future employees. The relationships of educational personnel to the occupational population can stimulate other forms of partnerships in educational program or facility development.

3. The student enrolled in an occupational education program where the cooperative approach is employed, will have an opportunity to gain insight into a more realistic choice of an occupation. Limited experiences and perhaps limited exposure to some aspects of an occupation, will

perhaps prevent some co-op students from gaining all the information needed to make a more realistic choice but certainly it should be closer to being realistic than if he were not exposed at all.

4. During the enrollment of a student in an educational program cooperative in nature, student, teacher and employer have an opportunity to determine these weak areas in student abilities that may be strengthened with related instruction or repeated skill development. It is a concentrated effort by all involved to develop worker ability to perform a specific job or jobs within a specific occupation.

5. Where there is a diversity of occupations represented in a class in cooperative education, there will be exchange of ideas and attitudes toward the occupation in which each student is employed. This exchange offers an opportunity for the student to broaden his knowledge about the work force and about the attitudes of other workers and/or employers toward work and its place in our lives.

I mentioned earlier something about a New Approach to an Old Problem. Let me share a thought about a "New Approach to an Old Problem."

If we are going to offer the same kind of programs we have in the past, we will be offering an "Old Approach to an Old Problem" and still have the same difficulties and failures we faced in the past. Please do not misunderstand me, there have been many successes in cooperative education preparation, I am only saying we can and should have a much higher degree of success -- that is, students should be successful and we in turn will then have succeeded in our endeavors.

We must look for new methods of using cooperative education, we must relinquish the idea that we can teach an occupation without ever having set foot in the industry or business that will employ our students and graduates. We must become masters at communication skills, be able to build in evaluation of our programs as an integral part of the curriculum and be able to provide the leadership needed in the community to promote the idea of everyday preparation for the world of work.

This is no easy task, it may cause a complete revision of thinking on the part of many individuals, it may necessitate a revamping of fiscal affairs for many institutions of learning and perhaps for entire school systems, it may mean beginning to talk to people who have never been involved in education before, except perhaps as a recipient. All of these things might bring about a change in attitudes toward occupational education that we so sorely need in most of our communities, including the educational community.

If I may again refer to the field of the occupation I know best, health occupations, I would like to suggest to you that there are forces beyond those of us in education who are suggesting we take a close look at new approaches to occupational education.

JUSTIFICATION FOR COOPERATIVE APPROACH IN HEALTH OCCUPATION EDUCATION.

Let me read something to you.

1. "The number of health workers in 1965, about 3.3 million persons, is expected to increase more than 60 percent by 1975, according to a report from the Bureau of Labor Statistics. The public's demand for medical and health services, supported by increasing federal and private insurance programs and higher levels of personal income, accounts for the soaring rise.

   "Although hospitals now employ the majority of health workers, the outlook is for rapid employment growth in other health areas. This is due to the expansion of preventive medicine and out-patient treatment programs and the increased use of extended care facilities and nursing homes.

   "The Department of Labor report also discussed the expected decline of professional and technical health workers, as a proportion of the total number of health workers, due to the increased use of supportive personnel to perform routine non-technical functions. A major exception to the trend is laboratory, radiologic, and dental technologists. The growth of personnel in these three occupations is expected to double as a result of the expanding use of laboratories, new instruments, and X-ray techniques for diagnosis and treatment."[1]

2. The American Nurses Association will present a resolution to its delegates in convention in Miami Beach in May supporting the expansion of employment and educational opportunities for the social-economically disadvantaged.[2]

3. In New Hampshire "The Citizens Task Force points out that special education for one "special" persons costs $14,490 as compared to a life time expense of $100,880 for care at the Laconia State School."[3]

These quotations suggest to me three reasons to consider the development of educational programs for health occupations using a new approach. We must expand our vision to include meeting the needs not only of the employer but of the employee; as well as meeting the needs of the recipient of the services to be supplied by the worker and employer.

The first quotation from the Health Careers Council suggests to me the need to re-emphasize the quality of education in technical programs.

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[1] "BLS Employment Forecast for Health Field: Up, Up, and Away!" in Pathways to Health Careers. Health Careers Council of Illinois, August 1969.

[2] American Journal of Nursing. American Journal of Nursing Co., New York Vol. 70 No. 3, March 1970 Page 589.

[3] "Diggings" from Health Occupations Education, Division of Vocational-Technical Education, N. H. Department of Education, Vol. 1 No. 5, February 1970.

If numbers of technicians will be reduced proportionally to workers performing non-technical tasks, those graduates of technical programs must be ready to assume a changing role; to be ready to supervise and to teach other personnel. It would therefore, appear that the students within our technical health occupation education programs must be offered a program of instruction of the highest quality and with the broadest possible base.

The cooperative approach to technical education programs in health occupations should be considered as one method of broadening the basic program as well as permitting students of high ability to enter into a course of study that may otherwise be closed to them.

As I suggested earlier some occupations may not be considered when investigating the use of the cooperative education approach. State Statutes prevent us from changing some type of programs but many occupations do not require licensure or registration, and some statutes do not regulate the <u>method of teaching</u> employed in the educational program.

I would like to close with a comment made by Mr. Ralph Kuhli, Director, Allied Medical Professions and Services AMA, a fellow participant at this Clinic.

> "As we start this new decade of the 70's, let us step up to our use of the machinery of organizations to work on solutions to the problems which vex us all. The key problem is not that some profession or organization won't let us do what needs to be done. The key problem is work: there it is, piled up in front of us! Let us roll up our sleeves and get on with it. We can cope with the biggest problems if we work on them together. This will be a decade of accomplishment. Let us act as rapidly as we can, but be patient and persistent enough to allow time for our cohorts to consider the change with us. For those of us willing to work, change and cooperate, things look good for the 1970's."

TOMORROW'S TECHNOLOGY TODAY

"Technology is moving forward at an ever increasing pace. A statistic often quoted points out the challenge being placed before all of us, because it says of all the scientists who ever lived, 90% are alive today. It is our problem and yours to keep up with these rapidly expanding technologies. We must not only keep up -- to survive, we must also bring about these changes. We must be ready to adopt, adapt, and adjust to these changes."

With this appropriate phrase, Mrs. Jones, one of the Senior Research Chemists for National Cash Register Company (NCR), began one of the most interesting and informative presentations of the 1970 American Technical Education Association convention. For seventy (70) minutes Mrs. Jones amazed and enthralled a most attentive audience. Her "Tomorrow's Technology Today" presentation was designed to accentuate some of the superb accomplishments of NCR in the fields of materials research, communication, chemical research at NCR, thermochromics, photochromics, and Photochromic Micro Imagery (PCMI).

A complete in-depth report cannot be given Mrs. Jones' presentation due to the length and character of same; however, a short description will be given each area in the presentation.

Materials research at NCR includes the study of materials and processes and how they can be used to better advantage. Plated magnetic tapes, discs

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Presentation by Marjorie Lyon Jones, Senior Research Chemist, National Cash Register Company, summarized by David A. Gondry, Assistant Professor of Engineering Graphics, Miami-Dade Junior College.

and drums for recording and storing information have increased wear characteristics and storage capacity when compared to present-day tapes. NCR's planar thin film memory components may replace today's "rod" memories. These components are exceptionally fast (peco sec.), reliable anl more economical than present-day system components, while occupying less space. Cathodoluminescent films of high brilliance and resolution capability permitted development of the smallest TV screen in the world -- a picture 1/16 inch on a side. This amazing accomplishment was shown at the New York Worlds Fair. These films also make possible new display systems of high resolution and reliability for the business industry.

Integrated or molecular circuitry makes possible the development of microscopic circuits (thousands on a quarter sized wafer) which replace the tangle of wires and components previously requiring several square feet of space. This development could add to the construction of small, briefcase sized computers -- a not too practical concept, however.

Mrs. Jones stressed the need for individuals as well as machines to be able to communicate properly. This entails machines "talking" to machines and individuals talking to machines. The U. S. Postal System has begun to utilize the NCR developed "Tagged Postage Stamp" phosphorescence which is used to position mail for automatic stamp cancellation as well as to separate first class from air mail. A zip code reader has been developed by NCR that actually "reads," thereby automatically routing the mails. Strides are being taken toward the conversion of our written and spoken word to reliable machine language. Magnetic Image Character Recognition makes possible positive identification of say, a person attempting to cash a check, while optical character recognition and speech synthesis speed business transactions over tomorrow's visual telephones.

The Early Bird communications satellites make possible ultra fast, interference free intercontinental communications. Laser technology, while still very new, is showing signs of becoming the prime means of moving large amounts of messages quickly over long distances -- into space for example.

Chemical research at NCR is directed toward the ability to produce, control and manipulate color for useful business machine applications. The need for an inkless printer became apparent soon after business demanded more reliable, faster and more economical business forms. The development of a colorless oil and reactive clay followed -- with present research on microencapsulation promising to expand into areas other than business forms. Microencapsulation permits tiny amounts of various substances, soaps, oils, fragrances -- even liquors, to be encased and attached to sales articles for customer approval. Business forms need only to have pressure applied to release colorless inks or oils which react to a backing material, thereby producing true "inkless printing" in a variety of colors. Many schools and businesses use "carbonless" paper -- a development utilizing the microencapsulation process from National Cash Register Company.

Various other applications of microencapsulation are being marketed today. Measurin -- an eight hour time release aspirin, the perfect dry martini, solid gasoline (with no danger of accidental ignition), paint primer

on rivets, flavored cigars and new convertible cigarettes, as well as rigidized space age foams for homes and space ventures.

Thermochromics (color with heat) processes are becoming more widely used as a result of NCR research and development. Thermochromics make possible copy paper for office duplication and printing applications without skilled offset press operators or expensive equipment. Thermal printers utilizing thermochromic papers are being adopted by the federal government due to high speed capabilities, electronic compatibility, noiseless operation, and solid state reliability. Visual display machines could utilize thermochromics for displays in color.

Photochromics (color with light) permits the formation of color by activation with light. The paper can be both activated and erased with light - permitting high speed printing -- or -- chemical memories for computers of the future. Colors via photochromics can be controlled to last from less than seconds to years. Eye protection from nuclear blasts is virtually instantaneous. As with thermochromics, photochromics have the capabilities of becoming displays and indicators for future machines. Multiple color formation transmitted on one wavelength of light provides fast reliable displays in multiple colors. Non-conventional photographic films require no development or processing, have no limit to resolution and can be corrected easily by reversing the photochromics.

NCR's PCMI (Photochromic Micro Image) is a new information storage and retrieval system. One 4" x 6" transparency of exceptional resolution contains 3200 pages of information -- enough for an entire list of specifications and parts for a standard American automobile, including pictures. The entire Holy Bible is printed on one PCMI card of less than two square inches. The NCR viewer is designed to find each page of information and project it on a screen to original size. PCMI future applications could revolutionize libraries of the future, store microscopic patterns of binary bits of computer data, and publish the micro image size characters via software which would process PCMI type cards. Finally, the laser could be utilized as a unique light source for printing micro image size characters, while holography and the laser could index the PCMI cards.

Mrs. Jones' presentation was indeed an interesting look into the future -- a future in need of new and more comprehensive programs to keep pace with the ever increasing technological developments of National Cash Register Company.

THE USE OF THE STATE ADVISORY COUNCIL AS DELEGATED BY THE '68 ACT

INTRODUCTION

For many decades vocational educators have used business and industry leaders to see that vocational education programs are geared to the needs of students, employers and society and to serve as a means of program support from the general public. The Smith-Hughes Act of 1917 created State Boards of Vocational Education and a Federal Board for Vocational Education. The State Boards were to be separate from the State Board of Education. At first, both the Federal Board and the State Boards were active and influential. History reveals that State Boards of Education gradually assumed the responsibilities of the State Boards for Vocational Education. The Federal Board lost its audience and was killed.

The new social agency which I represent today is somewhat a parallel to those agencies created in 1917. Hopefully though, enough things are different in terms of legislation, structure, functions and funding to maintain the new State Advisory Councils on Vocational Education as viable, important and influential agencies for a long time to come. Whether this is true or not depends much upon the actions taken by the Councils over the next few years.

Presentation by Joseph R. Clary, Executive Director, North Carolina State Advisory Council on Vocational Education.

The Vocational Education Act of 1963 established a National Advisory Committee on Vocational Education. It also made mandatory the creation of State advisory councils in all States where persons familiar with the vocational education needs of management and labor in the State were not represented on the State board administering vocational education programs. The National Advisory Committee was assigned the responsibility of advising the Commissioner of Education on policy matters, including the preparation of general regulations for all Federal vocational education programs. The State advisory councils established under the Vocational Education Act of 1963 apparently did not function properly. In my own State, to my knowledge, the council never was called together for a single meeting. Perhaps this explains somewhat the new emphasis on advisory councils in the Vocational Education Amendments of 1968.

THE NATIONAL ADVISORY COUNCIL

The Vocational Education Amendments of 1968 require the establishment of a National Advisory Council and charges it with advising the Commissioner on program policy, evaluating program effectiveness, and reporting its findings and recommendations annually to the Secretary of Health, Education, and Welfare for transmittal to the Congress.

The National Advisory Council is a 21 member body, appointed by the President. It has been extremely active since its organization. Its First and Second Reports are concise, hard-hitting and provocative documents.

If you have not seen these reports, I would urge you to request copies immediately.

STATE ADVISORY COUNCILS ON VOCATIONAL EDUCATION

The Amendments also require the establishment of a separate State Advisory Council on Vocational Education in each State desiring to participate in the Federal funding for vocational education programs. The State councils are appointed by the governor except in those States in which the designated State board for vocational education is elected. If the State board is elected, it may appoint the council members.

Membership. The membership of the State advisory council shall exclude members of the State board for vocational education and shall include:

(a) (i) At least one person familiar with the vocational needs and problems of management and labor in the State.
(ii) At least one person representing State Industrial and economic development agencies.

(b) At least one person representative of community and junior colleges and other institutions of higher education, area vocational schools, technical institutes, and post-secondary or adult education agencies or institutions, which may provide programs of vocational or technical education and training.

(c) (i) At least one person familiar with the administration of State

and local vocational education programs.
(ii) At least one person having special knowledge, experience, or qualifications with respect to vocational education and who is not involved in the administration of State or local vocational education programs.

(d) At least one person familiar with programs of technical and vocational education, including programs in comprehensive secondary schools.

(e) (i) At least one person representative of local educational agencies.
(ii) At least one person representative of school boards.

(f) At least one person representative of manpower and vocational education agencies in the State and the Comprehensive Area Manpower Planning System of the State.

(g) At least one person representing school systems with large concentrations of academically, socially, economically, and culturally disadvantaged students.

(h) At least one person with special knowledge, experience, or qualifications, with respect to the special educational needs of physically or mentally handicapped persons.

(i) Persons representative of the general public, of whom at least one shall be representative of and knowledgeable about the poor and disadvantaged, who are not qualified for membership under any of the preceding categories.

Functions and Responsibilities. Each State Advisory Council is charged with the following functions and responsibilities:

(a) Advise the State board on the development of the State plan, including the preparation of long-range and annual program plans and prepare and submit a statement describing its consultation with the State board on its State plan.

(b) Advise the State board on policy matters arising in the administration of the State plan submitted pursuant to the Act and the regulations.

(c) Evaluate vocational education programs, services, and activities under the State plan, and publish and distribute the results thereof.

(d) Prepare and submit through the State board to the Commissioner and to the National Advisory Council an annual evaluation report, accompanied by such additional comments of the State board as the State board deems appropriate, which (1) evaluates the effectiveness of vocational education programs, services, and activities carried out in the year under review in meeting the program objectives set forth in the long-range program plan and the annual plan, and (2) recommends such changes as may be warranted by the evaluation.

(e) Prepare and submit through the State board an annual budget covering the proposed expenditures of the State Advisory Council and its staff for the following fiscal year.

Staffing. In order to carry out its functions and responsibilities, each State Advisory Council is authorized to obtain the services of professional, technical and clerical personnel. It is also authorized to contract for services needed in meeting its responsibilities. The staff of the Council may not include members of the State board and is subject only to the supervision and direction of the Council with respect to all services performed by them for the Council.

Budgets. Funds are authorized under the Amendments to pay staff and other Council expenses needed to carry out its functions. The amount of the authorization is equal to 1 per centum of the State's allotment but shall not exceed $150,000 and shall not be less than $50,000.

Meetings and Rules. Each Council is required to meet within 30 days after its certification is accepted by the U. S. Commissioner of Education and elect from among its membership a chairman. The time, place and manner of meeting shall be as provided by the rules of the Council. The rules must provide for not less than one public meeting each year at which members of the general public are given opportunity to express views concerning vocational education.

THE NORTH CAROLINA COUNCIL

The North Carolina State Advisory Council on Vocational Education is a 34 member council appointed by our Governor, the Honorable Robert W. Scott. The Council meets quarterly for regular meetings.

In order to work most effectively in discharging its responsibilities, the membership of the Council is divided into 7 committees as follows: Steering Committee; Personnel Committee; State Plan Committee; Legislation and Funding Committee; Special Studies and Evaluation Committee; Program Operations Committee; and Professional Development Committee. The Committees meet as needed between regular Council meetings.

The Council staff consists at present of one professional person - me - and one secretary. The present thinking of the Council appears to be toward maintaining a minimum staff and using more of its budget funds for evaluation, etc.

The North Carolina Council has already become quite active. Its major concerns to the present time have been in the areas of analyzing and making recommendations concerning the development of the State Plan for Vocational Education, the professional development of personnel associated with vocational education programs, and analyzing current evaluation efforts being made, identification of gaps in the evaluation process, and the development of a Master Plan for Evaluation of Vocational Education in the State. Members of the Council have also been involved in advising on a number of activities being planned by the State Board staffs.

The North Carolina Council has held its first annual meeting at which members of the general public were given an opportunity to express views on vocational education. Comments were basically supportive and complimentary, however, a few criticisms, concerns and suggestions were made which will later enter into Council deliberations.

Our Council recognizes the possibilities for conflict with the State Board of Education and its staffs. So far, those conflicts have not developed. The Council continuously reminds itself that it is an advisory and evaluation agency and not a policy making or policy implementing body. Every effort is made to keep the State Board and its staffs acquainted with the Council's actions, concerns, etc. The State Board and its staffs have reciprocated and assisted the Council in every way possible. The two groups have openly discussed the conflict possibilities and do not fear them.

OTHER STATES' ADVISORY COUNCILS

All other States and Territories have organized these Councils, separate and independent of the State boards, with similar functions to those of the North Carolina Council. Their organizational patterns differ, their staffing patterns may differ, their methods of operation may differ. They should all, however, be influential agencies concerning the programs of vocational education being developed in the various states.

SUMMARY

The Congress has created a new social agency, the State Advisory Council. It was created as an agency to be <u>separate</u> from and <u>independent</u> of the State Board of Education. Advising on State plan development and on policy matters arising in the administration of the State plan and evaluation of programs, services and activities conducted under the State plan are chief among its functions and responsibilities.

The State Advisory Councils should become important and influential groups concerning the development, implementation, and evaluation of vocational and technical education programs in each State.

I would suggest you become acquainted with the Council in your State, attend some of its meetings, feed information into it and keep up with its concerns and deliberations.

You have nothing to fear from the Councils. They join with all of us in trying to see that the best possible instructional programs are provided for our citizens.

ACCREDITATION, LICENSURE, AND REGISTRY IN THE FIELD OF ALLIED HEALTH AND MEDICAL TECHNOLOGY PROGRAMS

My assignment to discuss with you those matters of accreditation, licensure, and registry in the fields of allied health and medical technology has posed a rather difficult task for me. In the first place, whatever one says concerning any kind of evaluation or procedure for accreditation of programs or personnel in any educational field can very possibly become suspect of bias. With the very rapid growth of the many occupational or career programs in the post-secondary institutions in this country during the past ten years, the whole problem of specialized program accreditation has mounted an increasing concern for better and more effective ways of evaluating and judging the educational institutions' work. Another reason for difficulty in discussing with you this whole matter lies in the present fluidity of the whole problem -- positions and points of view are changing so rapidly that what I am indicating to you today may not be really as true tomorrow.

I shall have to be quite honest with you and tell you that my presentation today will center most directly on the area of accreditation. I do not feel competent to discuss with you in any detail the multi-faceted issues of licensure and registry. I think we should realize that we are really talking about three different areas of concern. Accreditation for the most part focuses on the program and its institutional setting. Licensure and

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Presentation by Kenneth G. Skaggs, Coordinator, Occupational Education Project, American Association of Junior Colleges.

registry focus upon the competency and the ability of the individual coming out of a program and an institution to perform the tasks for which he has been prepared in the educational program. Licensure, again, is generally a responsibility of the individual state. The prospective worker must pass licensure examinations and must be tested in his competency and skills. Generally, again, registry is the responsibility of professional groups representing the various occupations and representing the employers of personnel, and registry of the individual usually confirms that the program in which he received his education and preparation for work should enable him to perform competently and well. Examinations and tests are usually a part of registry also.

Requirements for registry differ from one professional group which administers the registry to another. Requirements for licensure, even for individuals in the same occupation, may differ from state to state. For information concerning the exact procedures and the requirements for licensure, you should communicate with the state board for the occupation in your state; and for registry you should communicate with the national office of the professional organization registry.

The concerns of accreditation, therefore, will be the emphasis of our presentation today. Accreditation has long been a part of the educational process and the principle of accreditation was developed by educational institutions themselves. In the old Elizabethan language, we in the educational institutions, with the increasing proliferation of accreditation demands and the inconsistency developed in procedures, find ourselves "hoist with our own petard." Accreditation, of course, is simply another way of saying that we are pronouncing judgment on the effectiveness and the quality of courses and programs and the product which comes from them. As the demands of special accreditation have grown, educational institutions are becoming increasingly restless and hostile to the current methods, approaches, and procedures. Almost all of our educational institutions are subject to regional accreditation from their regional accrediting associations. Many feel that additional specific program accreditation is duplicative, costly in terms of money, time, and effort, and because subject accreditation is largely based on a set of principles quantitative in nature, is not really exercising very valid judgment. In other words, educational institutions are questioning very seriously not only the necessity of program accreditation as it is now administered, but are questioning even more sharply its cost, its approach, and its basic principles.

Our particular interest is in the field of health and medicine and, for our community junior colleges, in the allied health and medical technology programs. The matter of accreditation of these programs becomes somewhat more complex and certainly more serious because the degree of competency and the ability of the worker coming out of our programs to perform and to exercise effectively and well his direct functions may be directly related not only to the welfare and the benefit of a patient but could under some situations be a matter of life and death. Individual accreditation in these programs takes on a serious and important aspect.

I am perfectly aware, since I have had some role to play in its formation, of the resolution officially approved by the Board of Directors of

the American Association of Junior Colleges on January 4, 1967. The resolution in its entirety reads as follows:

> "The Board of Directors of AAJC reiterates its position statement of August 26, 1964, to the effect that 'regional accrediting associations should bear the primary responsibility for accreditation of community and junior colleges. These regional associations should examine and reformulate where necessary their procedures and policies so that they can evaluate total programs of community junior colleges.'
>
> "AAJC fully supports the policy statement forwarded on November 17, 1966, from the National Commission on Accrediting office which emphasizes this central, important role of the regional associations.
>
> "Further, AAJC offers its full cooperation in assisting professional agencies and the regional associations in their respective and combined efforts to assist community and junior colleges to strengthen and maintain the high quality of curricular programs.
>
> "The Board expresses its appreciation to the NCA for its effective efforts for the improvement of junior and community college accreditation procedures and policies and for its work on behalf of all education."

I think one point should be made very clear. Nowhere in the resolution is there a denial of the importance of accreditation, or even of program accreditation. The focus of attention is upon the method and the procedure for evaluating programs and their product. It should be pointed out that the strongest justification for the accreditation of programs as well as for licensure and registry in the allied health and medical field is the protection of the patient and the health and medical support for society in general.

As we turn to a more specific discussion of some of the current trends in the accreditation process, I would call your attention to several of the professional groups that are attempting to bring a unity and a consistent procedure to the accreditation of programs. The American Medical Association is one; the American Dental Association is another; the modifications made by the National League for Nurses in their original procedures and methods of accreditation is a third. Of course there are many agencies and professional groups representing specific programs that are not at all related to these larger professional organizations. As an example of some of the current trends in accreditation by the appropriate councils of the American Medical Association, let me use this Association as an illustration. Again I would like to precede this by repeating the justification for accreditation; that is, the physicians need to be very sure that allied health workers have the education necessary to prepare them to accept the increasing tasks being delegated by physicians to allied health workers.

In addition to four baccalaureate programs (for medical record librarian, medical technologist, occupational therapist, and physical therapist), physicians have been concerned with sub-baccalaureate educational programs for decades. At the request of the others concerned, the American Medical Association House of Delegates has adopted Essentials for sub-baccalaureate educational programs for nine allied health occupations: radiologic technologist, medical record technician, inhalation therapy technician, cytotechnologist, certified laboratory assistant, radiation therapy technician, nuclear medicine technician, medical assistant, orthopedic assistant. A request for National Commission on Accrediting and Office of Education recognition of the accreditation for baccalaureate level educational programs for the nuclear medicine technologist is pending. Essentials for the histologic technician are now before the AMA House of Delegates.

The AMA Council on Medical Education is accrediting a significant number of educational programs at the sub-baccalaureate level in educational institutions. At their March meeting in Seattle, the Council on Medical Education accredited sub-baccalaureate programs in junior colleges and lower divisions of colleges and universities for the following fields: certified laboratory assistant, cytotechnologist, medical record technician, radiologic technologist. Total Accredited in March, 1970: 15 programs. The Council's Directory of Accredited Programs includes the following sub-baccalaureate programs in educational institutions as of September, 1969: certified laboratory assistant, 52, cytotechnologist, 5, inhalation therapy technician, 28, medical record technician, 13, radiologic technologist, 401.

Junior colleges which request accreditation are being surveyed and accredited.

1. In September, 1969, the AMA Council on Medical Education adopted a formal statement to reaffirm its support for junior college programs in allied health and the Council's willingness to accredit such programs.

2. Routine AMA staff work includes serving on survey teams to review junior college programs for the medical record technician. All but two of the programs accredited by the Council on Medical Education for MRT are in community/junior colleges or technical schools.

3. The newly adopted Essentials for medical assistants is concerned solely with junior college (or lower division college) programs, and all schools accredited to date are in junior colleges.

4. The Essentials for the certified laboratory assistant include this statement: "Acceptable schools for training certified laboratory assistants may be conducted by approved medical schools, hospitals, acceptable laboratories, junior or community colleges, and technical-vocational schools suitably organized in accordance with present educational standards."

5. Inhalation therapy survey procedures have been reorganized primarily to meet the demand by junior colleges that their inhalation therapy programs be accredited.

6. New Essentials currently being drafted are primarily concerned with junior colleges (or lower division college) programs.

A new standard format for AMA Essentials has been adopted as a guide in revising all existing Essentials as well as drafting new Essentials. The standard format specifies that junior colleges be listed as acceptable for sub-baccalaureate educational programs.

Most of the educational programs for allied medical occupations are in hospitals rather than in colleges and universities.

It is planned that the second edition of the Directory will include the Essentials, lists for each of the occupations, and the annual report, as well as the consolidated list of all AMA approved allied health educational programs in each institution.

Here is the way in which one professional organization is moving. On Tuesday of this week at this very conference center, I met with a small group of people from the American Medical Association, the National Commission on Accrediting, and the U. S. Office of Education to discuss the issues and concerns of accreditation in the allied health field. This group, discussing informally the problems that so concern us with accreditation, proved to be a perceptive and far-seeing committee. I would hope that you in this audience, concerned as you are with the accreditation process and procedures for specific allied health and medical technology programs, will give the same depth of attention and concern to accreditation as it affects your institutions as did this committee as it looked at these problems generally.

As a kind of summary of this brief presentation to you, I would like to present to you some ideas that I hope will stimulate you in your own thinking and will be helpful to you in understanding the total process of accreditation. I know that you are aware that I have identified problems and issues, but have done nothing to give you resolutions to them. I cannot myself provide the answers to these problems. I may even have made more obscure some of the bases for consideration and thought. Hopefully, I have brought you some information and some clarification. With these preliminary statements, let me make now my comments for your own thinking.

Some kind of program evaluation and judgment of quality is going to be needed concerning allied health and medical technology programs. I am convinced of this because of the sensitiveness of the field and because the workers coming from these programs are going to be engaged in a field of work that directly affects the health and even the life of individuals. The professional leadership in health and medicine is not going to abbrogate what it considers to be its prime responsibility in exercising quality judgment on the people who will be a part of the health and medical team. I am convinced, therefore, that any absolute denial of program accreditation in the allied health fields is a futile and useless exercise.

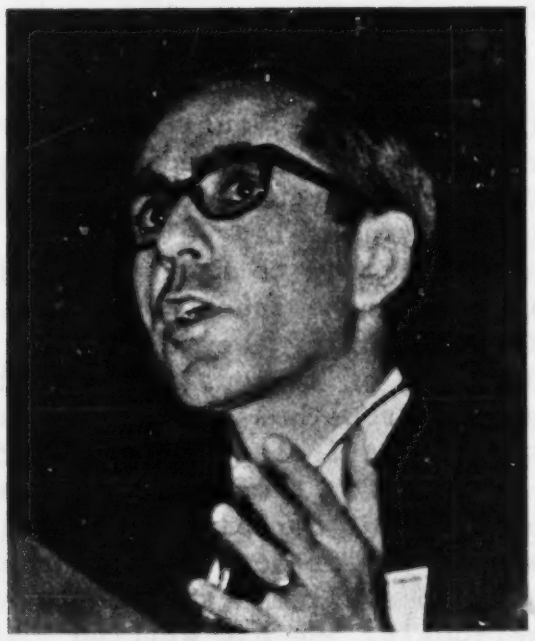
If we accept, therefore, the proposition that program evaluation is a necessary and a good thing in these programs, we focus our attention on the most effective procedures and methods for judging quality and an acceptance of procedures and methods that will affect our institutions with the least

cost of time, money, and effort, and which would, at the same time, offer ways to us for strengthening and improving programs. The procedures and methods of accreditation should work to the advantage of educational institutions and not be a principle of "policing" educational programs.

I would also submit to you that any kind of accreditation developed anywhere should be voluntary and should, I hope, be nongovernmental in nature. I would also submit to you that one of the ways in which we may find an acceptable accreditation procedure and method for various programs would be in the unified accreditation approach. This idea of unified accreditation is the basis for the AAJC Board of Directors resolution. It was suggested in the resolution that regional accrediting bodies have prime responsibility for program accreditation where needed or required. It could very well be that another body with the authority and the means to act could become the unifying force in accreditation. You and I know very well that our institutions cannot live with a procedure of specialized program accreditation that would call for a number of separate groups to come on our campuses, each requiring long preparation of survey materials and various other informational gambits, each consisting of three to seven members of the accreditation team, all of whom must be paid expenses and honorariums, and each consuming several days of program time, and each making its own unique demands and requirements on administration, faculty, and students. No institution has the time, the money, or can it expend the effort for this kind of wasteful, duplicative, and meaningless accreditation.

If there can be a unity brought into the whole procedure of evaluation so that accreditation can be accomplished through one body or through only a small number of agencies and also that application can be made to developing programs, it is my belief that our institutions could find this an acceptable part of the educational program.

In closing, let me urge that you make use of the sources now available to learn all you can about the current accreditation for allied health programs. Such information can be obtained by writing the National Commission on Accrediting, the American Medical Association, the American Dental Association, or the National Health Council. These sources can also give you specific information concerning many of the laws governing licensure and the regulations governing registry. Also as a conclusion of this presentation to you, I would appreciate receiving from you any suggestions or ideas concerning acceptable ways for professionally judging and evaluating the quality of our programs and the student product which comes from them.



OCCUPATIONAL EDUCATION IN THE PRIVATE SECTOR*

In order to discuss and assess the role of private vocational schools, it is necessary to establish the interrelatedness of virtually all private and public educational and training systems.

The economist usually thinks in terms of alternatives, or what are known as opportunity costs. For example, the real cost of this paper is the time and thought I have given to preparing and presenting it, measured against what other task I could have done with the same amount of time and thought. It is quite simple, by the way, to establish your cost of being here. Your immediate alternative is sunning or surfing on the fine beaches of Miami.

The basic principle I have alluded to is presumably not only widely understood, but in fact, practiced by sensible people who have never taken a formal course in economics. Because of its basic truth, it is useful to present a definition of economics frequently offered at the beginning of an

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*The views expressed do not necessarily reflect policies or positions of the W. E. Upjohn Institute for Employment Research or the Ford Foundation, which financed a much larger study concerned with the potential usage of private vocational schools for training disadvantaged persons.

Presentation by A. Harvey Belitsky, W. E. Upjohn Institute for Employment Research.

introductory course: Economics studies the allocation of scarce resources among competing or alternative uses.

Most economists recognize that man's needs, which are physical, cultural, and spiritual are limitless and can never be fully satisfied, because resources are limited. We, in our so-called affluent society, must continue to contend with the reality of scarce resources,--even if we are, of course, generally well-off as a nation. It is my belief that the people who are unwilling to face this basic condition of scarcity, and therefore claim it has somehow been conquered, actually find many of our standards repulsive. In particular, they object to what they consider the excessive or wasteful purchase of various consumer durables such as automobiles, television sets, and numerous household gadgets. I happen to share the distaste for lack of taste, but I also believe that changes should arise primarily within people --except for those justifiable times when the government decides that our purchase of certain consumer goods represents a danger to ourselves, to those around us, or to our environment. Bruno Bettelheim has given pointed expression to a dilemma that certain well-intentioned reformers ought to take seriously. He has written "...I am very dubious about trying to save the world. People who know THE right answer end up burning other people at the stake."[1]

Well, what does all of this have to do with private vocational schools--or with my earlier point that such schools cannot be considered apart from public education and training institutions? All of you will surely agree that the educational resources available now (and under the best of conditions) will necessarily be limited or scarce. Therefore, like any other sector of society, you, as educators, must be concerned with the best possible allocation of educational resources among various alternative uses.

The interrelationship between private and public education exists even when the contacts between the two systems are neither close nor cordial. For example, the private vocational schools, which require high school graduation or even less for admission, enroll many high school graduates who are actually not ready to begin their vocational training. In order to correct such academic deficiencies in their students, some private schools must provide a preparatory program for the great majority of their incoming students. Other schools adjust to the poor preparation of their students by presenting course materials in a more simplified form. Many schools even allow their students to repeat portions of a course at no additional tuition charge. However, any of these remedial measures has a "cost" which only the student bears--namely, the extra time he must spend in school, or the lesser achievement which may affect his vocational choice and career development.

There are, of course, explanations for the presumed failure of many high schools to prepare their students adequately. Even before colleges were trying to cope with demands, the public schools felt the fury of varied and often conflicting claims. For example, most school systems responded in an

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[1]Mary Harrington Hall, "A Conversation with Bruno Bettelheim," Psychology Today, Vol. 2, No. 12, May 1969.

exaggerated way to the articulate, middle-income parents who insisted on first-rate college preparatory programs for their children. Later, and often concurrently, other groups lambasted the schools for providing only elementary industrial arts courses for students in vocational education. Then, not long after many school systems began developing preparatory programs for craftsmen and technicians, still other groups, or even the same groups, asserted that the needs of a rather large number of the less bright or **analytical** students were being ignored. Finally, the United States Commissioner of Education declared war on illiteracy and pledged that every child would be reading at his maximum capability by the end of the 1970s.

Even this sketch of the varying duties demanded of the public secondary school system might lead one to think of a boxer felled by blows, only to be punched again shortly after standing up. In more literal language, we can simply note that the demands placed upon high schools have often been excessive and conflicting.

Nevertheless--and indeed perhaps as a result of the experiences of recent years--the roles of public high schools seem to have been clarified. A prime challenge will continue to be the maintenance of basic education for all students at the highest possible level. Literacy must be a requirement for students who enter 2- and 4-year colliges, post-secondary vocational schools, or who move directly into nearly every type of employment.

The interconnection between the quality of education in high schools and student performance in junior or community colleges is surely keenly appreciated by you who are participating in this Clinic. However, the relationship between private vocational school programs and post-secondary education in the public sector is probably not quite as apparent. To start with, the role of the private schools must be understood. This is best achieved through a brief outline of the kind of instruction offered in the schools and the types of students attracted to such training.

The private school courses (synonymous with the term programs) are highly specialized and geared to the ultimate objective of employment. The curriculum includes only those aspects of general education which bear directly upon job performance. Training is provided in a job-simulated setting. Visual aids and operative equipment are typically more important than textbooks. Classroom or lecture instruction is usually immediately followed by related training in the school shop or laboratory in order to demonstrate the practical application of theoretical concepts. Instruction is given in short, sequential units which tend to reinforce previously learned materials: and a sense of achievement is experienced by the average student, because he is informed of his progress on a continuing basis, rather than at the conclusion of a term or semester. Altogether these aspects of instruction appeal so strongly to the students, that they contribute per se to rather high motivation. Students who were completely uninspired before, tend, in a sense, to "find themselves." Many of the courses in private schools are especially appropriate for persons who cannot, or do not wish to, postpone the attainment of their goals for a period of two years or longer. The average course length in a trade or technical school is 40 weeks.

Another significant aspect of the instruction offered by many of the schools is the provision of training at various levels of accomplishment within related occupations. For instance, in one school students may shift their concentration from a radio-television repair course to a more advanced course in electronics technology, or vice versa, depending on their demonstrated aptitudes and interests. Some schools even provide courses in different occupational fields and permit students to alter their specialty course. These options are, of course, advantageous to students who would otherwise fail the course or else be compelled to accept the dissatisfactions of employment in an occupation that is not their first preference.

Private vocational schools maintain informal but close contacts with industry, business, and the professions, and they are able to rapidly modify course contents when necessary. The stimulus of profits also leads to the establishment of new courses. For example, the private schools have pioneered with short, intensive courses in data processing and the allied health fields.

The allied health fields deserve special attention, because the volume of training resources required for this $65 billion industry is immense. Junior colleges and community colleges are naturally important in preparing people to enter this vast and diversified industry. Private vocational schools are also prominent trainers for such occupations as medical assistant, medical secretary, medical technician, nurse aide, dental assistant, and dental technician.

Since private schools and public colleges both provide training in the allied health fields, it is natural to raise several questions--including the likely forms of competition among the two systems and the differences, if any, in course content.

An economist may actually be tempted to refer to the private and public school system as "non-competing groups." The economist's technical term is usually reserved for those situations where competition is more apparent than real. Non-competitiveness in the allied health field can be established by examination of course content. As noted, the private vocational schools present only those academic and theoretical materials which are directly related to the occupational training; and non-related subjects (for example those of a liberal arts nature) are excluded. This is not the case, on the other hand, at the typical junior college and frequently at the community college, and the programs are necessarily longer than those given at a private school.

Other important factors ought to be considered. Available training facilities for the admittedly different programs in the private and public school systems are inadequate to meet the requirements for competently trained people. At the same time, existing facilities in at least some of the private schools are not being fully utilized. In view of the ever-present condition of scarcity, it is sensible to place students in these already existing private schools before increasing capacity through new construction. Students and older persons with employment experience have indeed been financially aided to attend such schools by a variety of government programs including Vocational Rehabilitation, Manpower Development and Training and federally-insured loans.

The 1968 Amendments to the Vocational Education Act offer a notable opportunity for still further utilization of the special capabilities and unused capacity in the private schools. Under this last Act, the possibility of establishing joint public-private ventures presents an exciting breakthrough at various levels of education. Thus high schools may subcontract with private schools for short vocational courses which they do not offer. Some observers are convinced that students offered this opportunity will apply themselves more seriously to the general education subjects in high school and will be much less likely to drop out of school. Only a few high schools have thus far tried such joint programs.

It seems to me that the more unfortunate experiences of high schools are relevant to the conditions in and the growth of junior and community colleges. Just as the high schools' mission has often been thwarted by numerous and conflicting demands, the expectations from two-year colleges could also lead to a confused and uneven development. I do not suggest that colleges refrain from offering vocationally-oriented programs. It does, however, seem sensible to distinguish the usual types of programs offered in your colleges from the shorter, more intensive courses which are the specialty of most private vocational schools. You have become expert in the longer programs, and of course recognize the need for a continuing effort at maintaining quality standards; and the private vocational schools ought to have the same goals for their essentially different courses.

The emphasis on quality education and training in all schools and colleges is, after all, the best way of serving students. Moreover, if the pursuit of excellence is to be encouraged and appreciated in all vocations, differences in personal preferences and aptitudes must be recognized. Therefore, two-year colleges should acknowledge that students with flagging interests may be better served by the more practical programs in private vocational schools. In such cases, transfer to the private schools could be recommended, or cooperative programs between both educational systems could be initiated. Similarly, private vocational schools must be alert to recommend attendance at a junior or community college when it is advisable for certain of their students.

Private schools and two-year colleges can remain in the forefront of their respective forms of education only if they maintain high standards of instruction, while they, at the same time, accommodate different student interests. Obviously, it would be harmful to students and to the educational systems if the schools and colleges act "out of character" by yielding to the forms of pressure that have left many high schools dazed and uncertain of their objectives and of the best ways for serving their students. Dr. John W. Gardner has aptly written: "We must have diversity, but we must also expect that every institution which makes up that diversity will be striving, in its own way, for excellence."[1]

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[1]John W. Gardner, Excellence, New York: Harper & Row, Publishers, 1962, P. 84.

STUDENT RECRUITMENT IN OCCUPATIONAL EDUCATION

Mr. Chairman, ladies and gentlemen, the word recruit, in the Random House Dictionary of the English Language, is defined in ten different ways:

1. a newly enlisted or drafted member of the armed forces
2. a new member of a group or organization, or the like
3. to enlist, as for service in one of the armed forces
4. to raise or increase (a force) by enlistment
5. to engage or hire (new employees, members, etc.)
6. to furnish or replenish with a fresh supply; renew
7. to enlist men for service in one of the armed forces
8. to renew or restore (the health, strength, etc.)
9. to recover strength, health, etc.
10. to gain new (strength) supplies of anything lost or wasted.

Now, if we look at this list of definitions objectively, we can plainly see that there isn't one definition that really fits anything that we think of ourselves doing in the field of technical or occupational education when we are attempting to attract new students.

We are not in the business of strengthening our position with new men or troops (or are we?). We are not called upon to fill our schools or enlistment. We do not have the problem of preventing or correcting exhaustion

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Presentation by S. Joseph Fantl, Public Relations Coordinator, Greenville, South Carolina Technical Education Center.

because each year there is an ample supply of new high school graduates who are to continue their education within the walls of a community college or technical education center. We have no reason to be concerned about the vigor or health of occupational education because it is the fastest growing, most energetic area of education and training in the United States today. We are not interested in enlisting men for the armed forces, and as the word recruit has been used, we are not interested in the lowest grade in the United States Army.

Now, what are we talking about? Could it be true that for the past ten or twelve years we have been using a misnomer to describe the activity of attracting young people into our institutions each year?

To many people, especially the young folks, recruiting is a dirty word. It connotates high pressure selling that leads the student into areas of training that he is not really wanting to pursue. Is this the thing that we, the educators and administrators of education, really want to do? I don't believe that it is. I would say that if we had the choice, we would much rather INFORM than recruit.

I feel that we should do away with the word recruit or recruiting and provide instead information, information not from the standpoint of selling but from the informational viewpoint of supplying the student with FACTS so that he can take a more objective outlook on the many, many courses of study available to him.

I know that many of you saw the motion picture "The Graduate." If you did, you'll remember the short scene that took place at the young man's welcome-home party after graduating from college. In the scene, a middle-aged businessman put his arm around the boy and led him away from the gathering and told him that there was only one word that he had to remember; just one word that would lead him to the road to success and happiness, and that one word was PLASTICS. My only comment is, let's not plasticize our youth by overselling them on fields of study that they may not have an interest in or ability for.

Our young people fill our corridors and classrooms each year because they want to be there; they are not brought into our schools through any compulsory law, coercion or force. They come to us because they have a purpose: they want to learn a worthwhile skill, occupation or profession; they want to learn so that they may have a valuable commodity to offer when they enter the business or industrial world---they did not have to be recruited, they had to be INFORMED! They had to be informed of the courses of study that were available, of the length of time that they would have to spend in school to prepare themselves in their chosen field, of the opportunities that awaited them if they were willing to apply themselves and pay the price that would be necessary to achieve their goal. They didn't have to be SOLD or RECRUITED; they had to be INFORMED.

If we agree on this, then we will have to do away with the word recruit, recruiting, recruiter, or recruited, or any other word that has the same connotation, such as drafted, enlisted, coerced, or forced. In place of these words let's use the word informed and call the person or persons

responsible for disseminating information to young people, who are prospective students of our schools, information officers, field representatives, informational advisors, curricula consultants, or educational consultants.

It is time to let the young person who seeks information know where and how that information may be obtained. It is time to lend dignity to the position that most of us now refer to as "Recruiter." It is time that we recognize the necessity of very close coordination between our people and those who work with the students in the public schools, the community, and our public relations department. All efforts to bring students into our colleges or centers will be the direct results of the image that our institution has in the community. Everything that we do in the area of public relations has a definite bearing on our ability to attract new students.

Now, if we are to attract our students through a good planned public relations program, then the first thing that we must examine is the publics that we have to appeal to in order to attract more students by informing them of the opportunity that awaits them in occupational education.

There are many publics that we can work through to disseminate the necessary information and establish the favorable image that will attract people.

Let us digress for a moment and examine what we are talking about when we say "public relations." In many cases, this term is distasteful to many people. Recently, I heard a person say, "I don't like the term public relations; it sounds greasy to me." What he really meant was that he associates public relations with ballyhooing, press agentry (Hollywood style), and the circus, and the county fair; he also meant that he did not trust the people who practice public relations as a profession, but public relations has come a long way since the days of P. T. Barnum and Diamond Jim Brady. It has been refined and re-defined, and it is now a very respectable profession that is practiced by approximately 6,000 people in the United States. Now, what is public relations? Let us consider this definition: THE PUBLIC RELATIONS FUNCTION IS A PLANNED EFFORT TO INFLUENCE OPINION THROUGH ACCEPTABLE PERFORMANCE BASED UPON TWO-WAY COMMUNICATION."

This could be a good workable definition because it encompasses everything that a good public relations program should accomplish if it is to inform potential students and give them the knowledge that they need to make an intelligent decision about their future educational needs and wants.

This definition states, "the planned effort to influence opinion through acceptable performance."

We know that in occupational education we must offer a wide variety of selective courses of study that will train people for the business and industrial complex in the geographic area that we serve; it would be ridiculous to offer marine engineering technology in the mountains of Tennessee or Agricultural Engineering Technology at Loop Community College in Chicago.

We also know that it is the performance of our graduates in business and industry that is the proof of our effectiveness and quality. We must

offer a broad curricula that is designed to prepare our students to take their place in business and industry and perform in a creditable manner. If we do not successfully accomplish this, our performance cannot be considered acceptable.

But the next question is, acceptable to whom? The answer is simple - acceptable to those publics which the institution wishes to influence; that is why we must examine the publics that will effect us in attracting students and perpetuating the flow of new people into our programs.

As we all know, the competition for students is keen. We are competing with the four-year colleges and universities, both private and public. Our competition also comes from private commercial schools whose ability to attract students is based on a "come now - pay later" or "guaranteed employment after graduation" approach, private technical schools, correspondence schools, and all other two-year post-high school institutions, private and public. Even the various departments within our own walls are in competition for new students.

All schools must have students in order to stay in business. Some of us who are state supported depend upon the number of students that we have enrolled each term or semester for the allocation of our funds; our income is based on our full-time equivalency students.

Other institutions depend upon their tuition to supplement their state, local or private allocations. In one way or another the financial factor, the funds that are so vital to our operation, are affected by our enrollment.

Therefore, the monetary aspect, and the perpetuating need for a steady flow of new students are two vital reasons for establishing a strong public relations or public information program within our institutions.

As we can plainly see, the more community support an institution has the easier it is to attract new students. In order to win the community support that we need, we must understand the various publics whose support we wish to obtain. We must take the time and the effort to learn how we can win their support through a planned effort designed to influence their favorable opinion through acceptable performance based upon two-way communications.

I believe that the publics that we must appeal to in our effort to attract new students are the general public, the news media, the public schools (high school and junior schools,) the student body, the parents of our students (and prospective students,) parent-teacher organizations, and community clubs and organizations.

The General Public------ by informing, educating, establishing rapport, establishing a good community image, assisting and aiding in community projects.

The News Media---------- by keeping informed of all activities (favorable or unfavorable), educating, assisting and aiding, adhering to a policy of honesty and truth in all dealings with them.

The Public Schools-------by keeping informed, giving due recognition for assistance, coordination with counselors, arranging student tours, arranging talks to student bodies, participating in assembly programs, school club programs, and college nights, continuously striving to cement good relations.

The Student Body---------by informing, assisting in student activities, issuing student publications, guiding, publicizing student activities, achievements, and projects. This should include high school and junior high school students. By assisting them, we can win their confidence and convince them of the value of our institution.

The Parents of Students--by informing, making welcome at your school, publicizing the achievements of their children, extending invitations to school affairs (open house, dedications ceremonies, commencement, etc.) placing them on the mailing list for school publications.

Parent-Teacher Groups----by informing, arranging speakers for their meeting, supporting their activities, inviting them to hold at least one meeting a year at the school, extending invitations to them to attend school affairs, arranging tours of the schools facilities for their members.

Community Groups---------by informing and performing the same services for them as listed for parent-teacher groups.

These are the publics that we must communicate with if we are to be successful in attracting new students each year. As you can see, the job of public information in relation to attracting students is quite comprehensive. The approaches that must be taken in communicating with each of these publics is completely different. Our approach to each group must be varied and our involvement with each of these publics must be <u>planned intelligently and well in advance.</u>

Now, the third part of our definition of public relations is, "based upon two-way communication." In other words, we can't possibly know how to appeal to our publics or where to exert our best efforts until we know the feelings and temperament of the publics which we must win if our institution is to enjoy a full complement of students each year.

I would like to show you the results of a survey that was taken of the entire student body at our school. This survey was conducted last September; we take the same survey each September to learn what factors are bringing students into our center.

The results of the survey were as follows:

21.53%	Another student told me about TEC
5.00%	A High School Guidance Counselor referred me
10.1%	A person in business or industry suggested I go
2.89%	Inquired after receiving a brochure in the mail
5.47%	My parents told me about TEC
20.26%	Read about it in the newspaper
16.27%	Heard about it on the radio
13.89%	Heard and saw about TEC on T.V.
4.59%	Other - Friend told me Relative told me Fiancee told me Supervisory Development Training Course A billboard or sign in a window Vocational Rehabilitation Counselor Posters A High School Teacher Someone at the hospital Plant bulletin board

6,159 students were interviewed and the percentages show the total overall results.

In a very recent student sampling the following facts were extracted from the interviews. This form was used as a guide to get the information we needed to determine our public information program for the coming year.

From the results of these surveys, we find that our efforts to inform the various publics and attract students to our institution may be improved by the following:

1. stressing the convenience of the school's geographic location to all parts of the city and county.

2. stressing specific programs and the tremendous future that lies ahead for the graduate; that there is more in this world than "PLASTICS."

3. stressing that every Johnny and Jane does not have to earn a baccalaureate degree to be successful in life, and that every Johnny and Jane is not intellectually motivated or mentally adapted to go to a four-year college or university.

4. stressing that the person who has a skill and can successfully work with his hands can earn an excellent income and be proud of his ability and occupation.

We learned that our students are enrolled in occupational courses because they are interested in the field of study that they are pursuing and enjoy the type of work for which they are preparing. We found that a large percentage (90%) are enrolled in the course that they really wanted, and that a large percentage of our students work, more part-time than full-time.

And one other statistic that I would like to mention is that 97% of the students are happy at TEC. This indicates that we <u>are</u> doing something right.

Now, let's look at one other set of figures:

WHERE DID YOU HEAR ABOUT TEC?

35% from a friend (word-of-mouth)
30% in high school (from a teacher or counselor)
13% from newspaper articles
12% on the radio
10% on television

These figures show that we need more exposure on television, more newspaper articles, and more radio time. If we concentrate on these medias of communications and maintained our word-of-mouth rapport and our work in the public schools, we could easily increase our enrollment.

One other question that should be answered when we talk about informing students: at what level should we start an information program that will give the student the opportunity to come to a logical and honest decision about his post-high school education?

Last year we went into the seventh, eighth, and ninth grades with these book-covers. The purpose of these book-covers was to give the student information on the course offerings available at our center and what courses they would have to complete in junior high school and senior high school if they wanted to be prepared to enter an occupational curriculum.

We went into the tenth, eleventh, and twelfth grades with a printed schedule of all of the local high school football teams in the county and a message to "Get into the game at TEC."

We went into the high schools with a student public relations team-students who could relate to other students. We let them talk to one another in their own language; we let them question us and we answered their questions - no pretty pictures.....no oversell.....just honest facts.

We found that we had to go where the young people were if we wanted to reach them. If they were in the pool halls that was the place to communicate with them. You can't reach the youth who needs occupational training at a ladies tea or at an uptown cocktail party, but on the street corners, in the youth centers, the Y.M.C.A.'s or the Y.W.C.A.'s - if you want to reach them you must go where they are.

We were interested in telling them what we had to offer THEM! In approaching the area of attracting students into our institution, as a part of our overall public information program, we must present the picture as it really is. We must not oversell the prospective student or his parents by using fictitious figures about the number of job openings in a certain field or of the amount of money the student can earn as a graduate of a certain curriculum. We must always use honest figures when releasing news articles regarding the size of our student-body, our enrollment, or any other area

that involves the statistics of the institution. Start to honestly educate and inform rather than recruit and oversell and watch the school grow.

The appeal that the institution has in attracting new students each year can definitely be correlated to the image the school has in the community it serves. So remember, "Without a good PUBLIC INFORMATION system, you'll never get off the ground!"

S A M P L E

GREENVILLE TEC/SURVEY

NAME_____ DATE_____
(Last) (First)

DIVISION_____ DEPARTMENT_____

ONE YEAR PROGRAM _____ TWO YEAR PROGRAM _____

1. Why did you decide to come to Greenville Tec, rather than a four year College? (If more than one please check.)

   ☐ Convenient Location.
   ☐ Interested in a specific program offered at Tec.
   ☐ Could not afford a four year college.
   ☐ Easier than a four year college.
   ☐ Did not want to go to a four year college.
   ☐ Other. (please state below)

   _____

2. What made you decide to take the course you are taking now? (Please check all that influenced you.)

   ☐ Needed this course for an entry job into my chosen field.
   ☐ Like this type of study or work field.
   ☐ Wanted to have more than a high school education.
   ☐ Other reason. (please state below)

   _____

3. Is this the course you really wanted to take here at Tec?
   ☐ Yes ☐ No (If No please state the course)

   _____

4. Do you work? ☐ Yes ☐ No
   (If yes, please check one) ☐ Part-time ☐ Full-time

5. Does the job you now hold related to the courses you are taking here at Tec?
   ☐ Yes ☐ No.

6. Do you feel the courses here at Tec will help you more than if you were at a regular college? ☐ Yes ☐ No

7. Do you feel the courses here at Tec are hard?
   ☐ Yes ☐ No

8. In general, are you happy here at Tec?
   ☐ Yes ☐ No

9. Where did you hear about Greenville Tec?
   ☐ High School ☐ Friend
   ☐ Newspaper ☐ T.V. ☐ Radio

10. Did this influence you to come to Tec?
    ☐ Yes ☐ No ☐ Other_____

The results of the survey were, as follows:

SURVEY QUESTIONS

1. Why did you decide to come to Greenville TEC, rather than a four-year college? **

		NO. RESPONDED
a.	Convenient Location	12
b.	Interested in a specific program offered at TEC.	22
c.	Could not afford a four year college.	2
d.	Easier than a four year college.	1
e.	Did not want to go to a four year college.	7
f.	Other reasons than the above.	3
		47

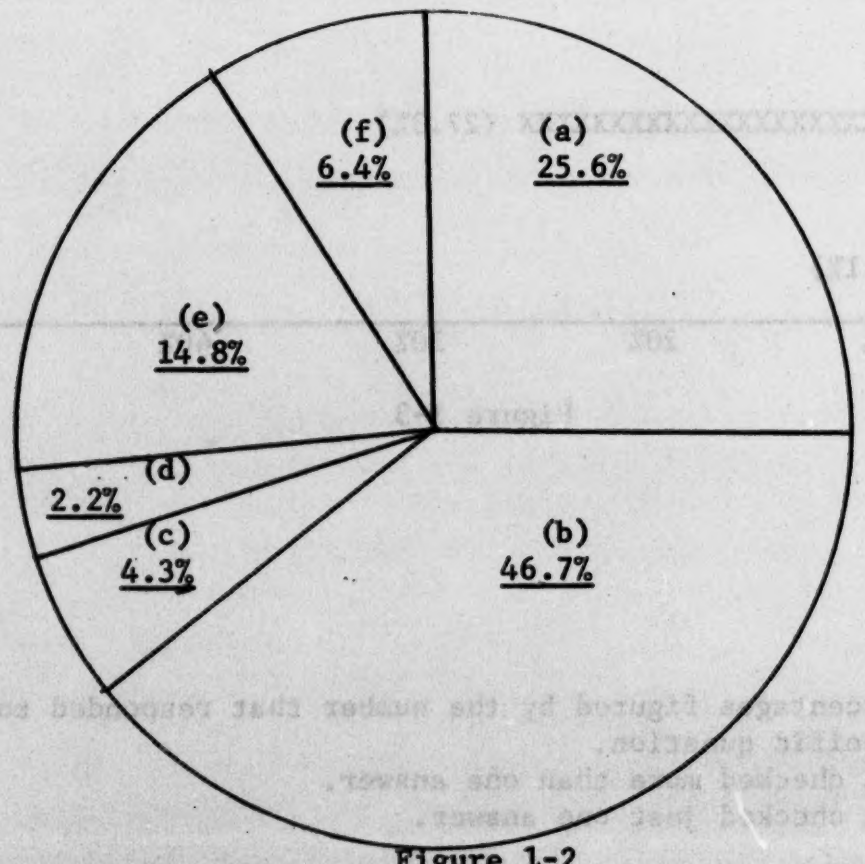
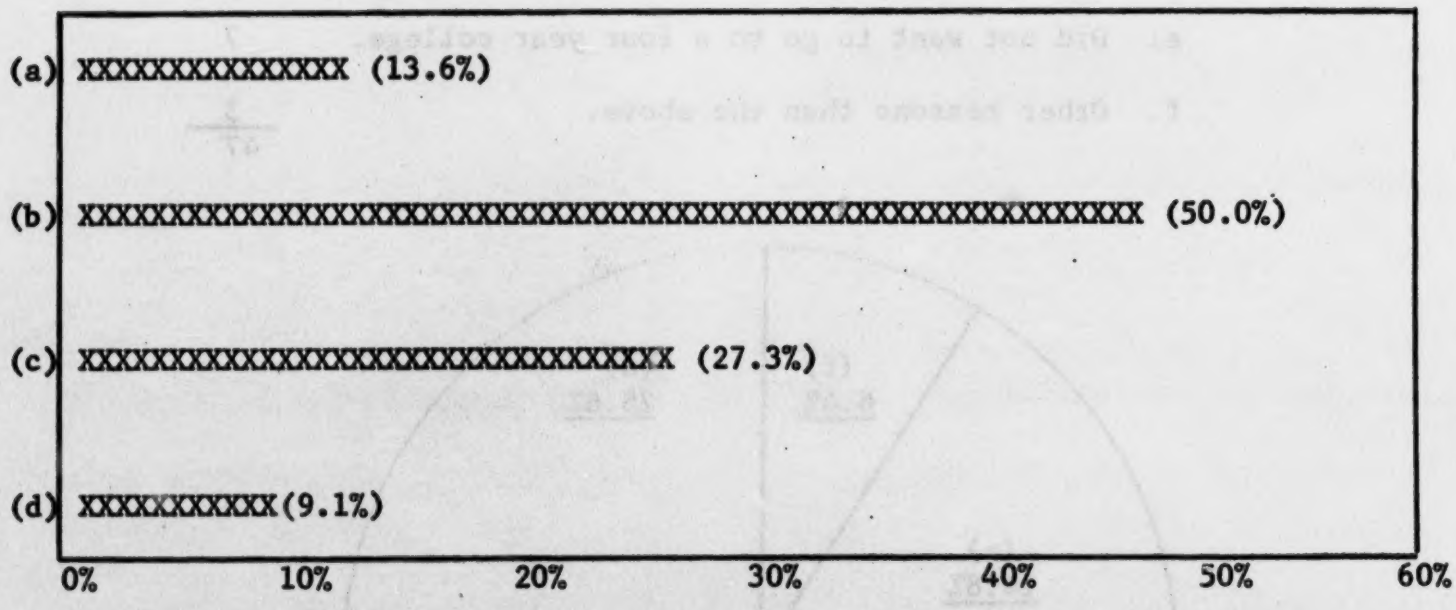


Figure 1-2

**NOTE: Pie-chart and percentages figures by the number that responded to this specific question.
60% checked more than one answer.
40% checked just one answer.

2. What made you decide to take the course you are now taking?**

	NO. RESPONDED
a. Needed this course for an entry job into my chosen field.	6
b. Like this type of study or work field.	22
c. Wanted to have more than a high school education.	12
d. Other reasons than the above.	4
	44


(a) XXXXXXXXXXXXXXX (13.6%)
(b) XXXXXXXXXXXXXX

3. Is this the course you really wanted to take here at TEC?

a. Yes b. No

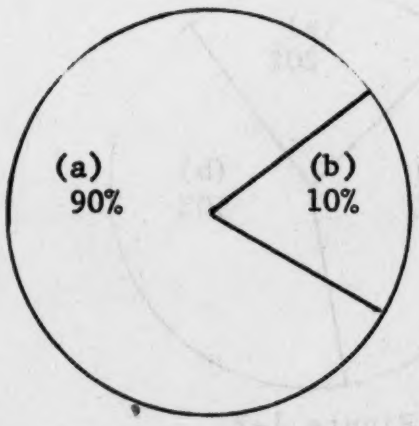


Figure 1-4*

4. Do you work?

a. Yes b. No c. Part-time d. Full-time

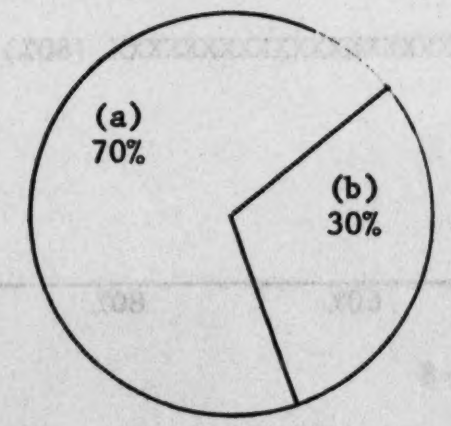


Figure 1-5*

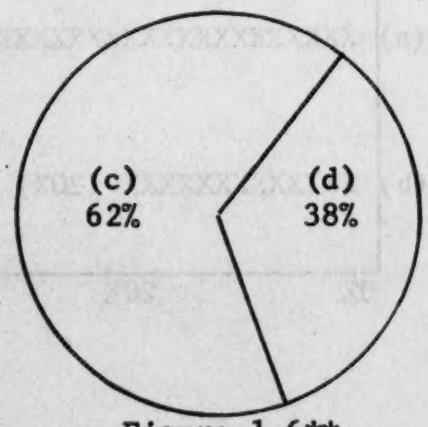


Figure 1-6**

*NOTE: Percentages figured by the number of the sample.

**NOTE: Percentages figured by the number that checked YES to question 4.

5. Does the job you now hold related to the courses you are now taking here at TEC?**

a. Yes b. No. c. Not working

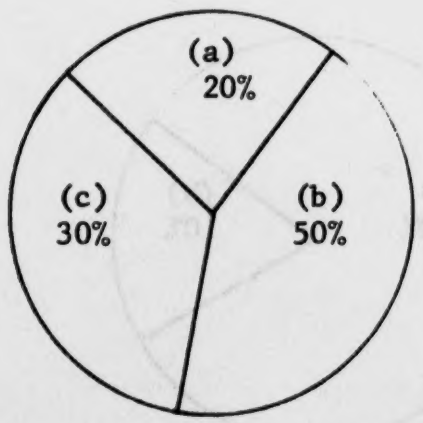


Figure 1-7

6. Do you feel the courses here at TEC will help you more than if you were at a regular college?**

a. Yes b. No

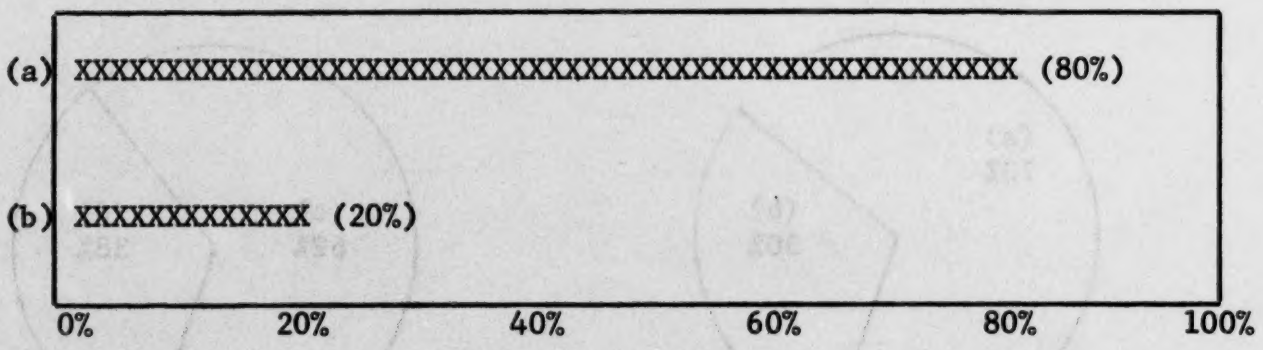


Figure 1-8

**NOTE: Percentages were figured by the number of the sample taken.

7. Do you feel the courses here at TEC are hard?**

a. Yes b. No c. Other

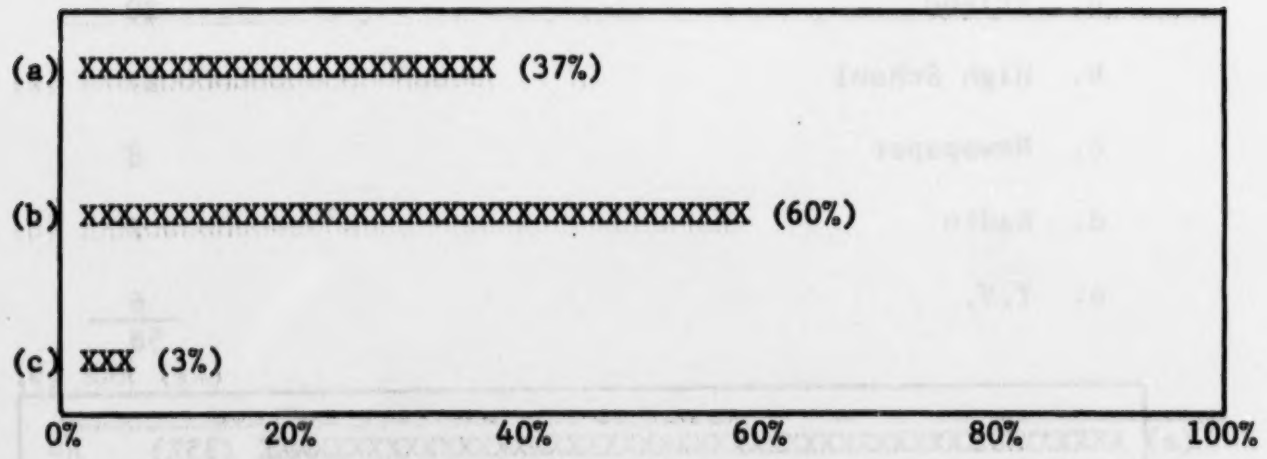


Figure 1-9

8. In general, are you happy here at TEC?**

a. Yes b. No

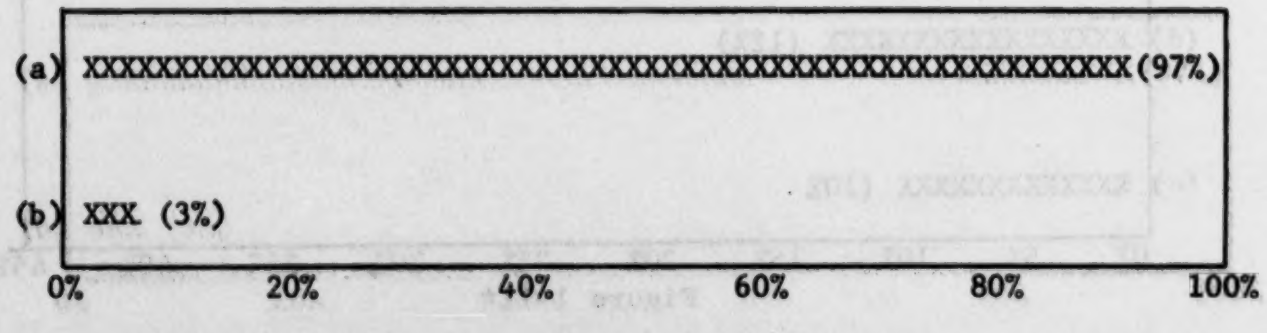


Figure 1-10

**NOTE: Percentages were figured by the number of the sample taken.

9. Where did you hear about Greenville TEC?

	NO. RESPONDED
a. Friend	20
b. High School	17
c. Newspaper	8
d. Radio	7
e. T.V.	6
	58

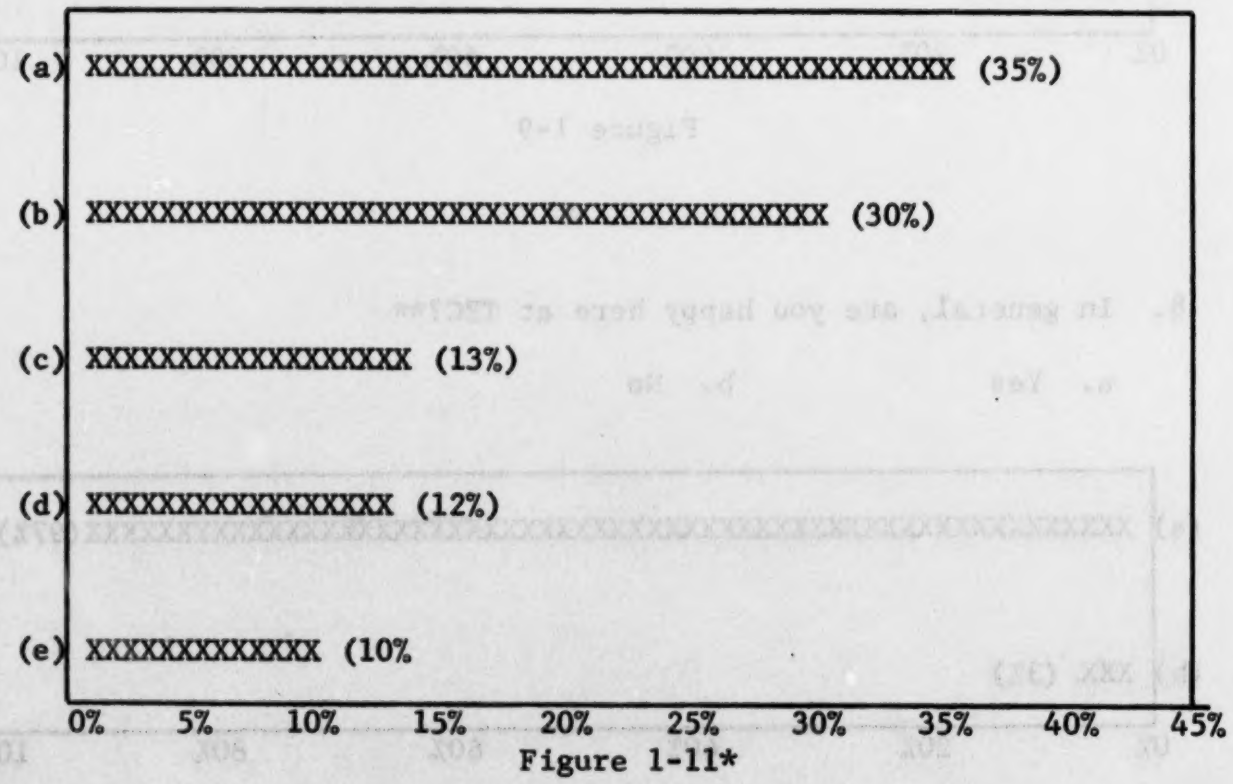

(a) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX (35%)
(b) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX (30%)
(c) XXXXXXXXXXXXXXXXX (13%)
(d) XXXXXXXXXXXXXXXXX (12%)
(e) XXXXXXXXXXXXX (10%
0% 5% 10% 15% 20% 25% 30% 35% 40% 45%

Figure 1-11*

10. Did this influence you to come to Greenville TEC?

a. Yes b. No

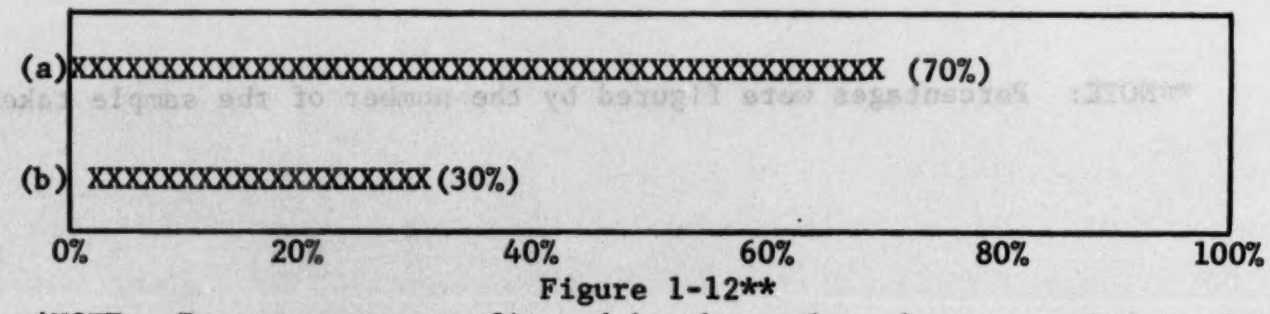


Figure 1-12**

*NOTE: Percentages were figured by the number that responded to this specific question.
37% checked more than one answer.
63% checked just one answer.

**NOTE: Percentages were figured by the number of the sample taken.

THE TECHNICIAN - HOW MUCH MATHEMATICS

INTRODUCTION

The process of addressing mathematics professors on the question "The Technician-How Much Mathematics" is probably the second most hazardous job in the world, topped only by the case where the mathematics professor addresses the same question to the teacher of technical specialties. I am risking both hazards here in knowledge of the fact that this audience is made up of both mathematics and technical specialty instructors.

My remarks are primarily geared to two-year engineering technology programs, but can be considered appropriate to business programs and possibly to health programs as well.

SERVICE

The principal characteristic of a typical two-year program in technology is its function of providing employability in a given field. Most of us prefer to see this employability with a field-oriented view as opposed to a job-oriented view. I refer you to the 1961 American Society for Engineering Education publication titled Characteristics of Excellence in Engineering Technology Education for a discussion of field-orientation vs. job-orientation. The field certainly requires greater breadth and knowledge than the single job requires. Whatever the case, a two-year program is brief and the

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Presentation by Frank L. Juszli, President, Norwalk State Technical College.

focus must be on appropriate material. This appropriateness pertains not only to technical specialty courses, but also the mathematics courses backing up the specialties.

The laundry list of possible mathematics topics in any program is massive and the methods of presenting those topics (whether with rigor, or proofs, or applications, or computer-orientation, etc.) merely magnify the size of the grab-bag. The best singular method of shortening the laundry list and shrinking the size of the grab-bag is acceptance of the fact that the mathematics program backing up the specialties is a service program. By service we mean "providing the basic, recurrent mathematical topics that appear in the technical specialties and foundation courses." This service function is appropriate in two-year fields other than engineering technology. More on these terms "basic" and "recurrent" later.

QUALITY AT A LEVEL

Some of us have a tendency, when attempting to define a mathematics course for technicians, to try to re-discover the wheel. Our biggest agony is often the cry of "quality" which we often confuse with "level." An appropriate viewpoint in any technical course, whether it be mathematics or a specialty is "quality at a level." The aforementioned publication Characteristics of Excellence in Engineering Technology Education contains a vivid discussion of "quality at a level" which was inserted in part into the Engineer's Council for Professional Development Policies and Procedures for accrediting two-year engineering technology programs.

To me, quality at a level means that we don't have to (and should not) rummage around in the grab-bag of topics looking for the nine-point circle or partial differential equations or fancy trigonometric identities or derivation of the equation of the brachistrone to prove that we have quality in our programs. These examples merely show the level at which we believe ourselves to be or wish upon ourselves. Our task as mathematics teachers is to gear ourselves to the appropriate level and do a quality job there.

DETERMINATION OF LEVEL

There are several factors influencing the level of a technical mathematics program. Perhaps the six most important ones are:

1. Employer needs
2. The mathematics faculty
3. The technical specialty faculty
4. Level of incoming students
5. Notions of transfer credit
6. The employed technician

Let us consider each of these.

Employer needs. A collection of studies in various states and districts shows that managers of technicians are more benevolent in stating mathematical needs of technicians than any other single group. Most of them point to a mathematical package regardless of technology which includes

a full command of arithmetic, very limited algebra, a few basic properties in geometry, and right-triangle trigonometry. I refer to a 1966 "Survey of Mathematical Expectations of Technicians in Michigan Industries" conducted by Wayne State University. These managers are probably the most reliable of all sources.

The mathematics faculty is probably the least reliable of sources. They are the most probable confusers of level and quality. Their own lofty schooling frequently betrays them, especially if they were mathematics majors in college, for they seldom know the true nature of technology. Technical applications frequently escape them.

The technical specialty faculty member frequently proves to be an unreliable, but important, factor in the level of mathematics required. His personal mathematics orientation, along with the mathematical orientation of his chosen text-books, effect him. He logically dictates the level of the foundation mathematics courses, frequently to the dismay of the mathematics faculty. Arbitrary changes in his program disrupt continuity in mathematics courses. He stand as the greatest daily critic of the mathematics faculty.

The level of the incoming student becomes the attack point of the mathematics and technical faculty. Pity the poor admissions counsellor! Many institutions have initiated pre-technical mathematics courses which operate as threshold courses to the first mathematics course in the two-year program; this frequently provides an essential method of entry, diminishes the drop-out rate, and preserves the level of the program.

Notions of transfer credit confuse the mathematics instructor terribly. He feels that his course is n.g. if it isn't accepted for transfer at the near-by University and is anxious to prove his worth by changing the course from pragmatic to theoretical and shifting the level. He tends to abandon the service concept in favor of transfer credit. He argues that he is still teaching the same topics, but forgets the technically oriented student who wants to see the "where do we use it" features of the course.

The employed technician frequently agrees with his manager on the nature of the mathematics required in his job. However, he often is enrolled in part time University extension courses and delivers to his former mathematics teacher the words that the mathematics teacher wants to hear, namely "I need more math!"

With these six factors pressing, plus others too numerous to mention, the question of "how much?" still hangs on.

BASIC AND RECURRENT

Certain mathematical operations occur in courses which are foundations of most engineering technologies. These foundations are invariably physics; and chemistry or materials; and drafting. Notions of proportionality, solution of linear equations, forces resolvable into rectangular components,

simple algebraic manipulations, roots, powers and recognition of graphical forms are among topics which are basic and recurrent in foundation courses. Second-year specialty courses use these basic topics repeatedly and frequently require additional topics. There is frequently commonality among some of these additional topics as we move from one technology to another. It is these basic and recurrent topics which have the highest demand in a technical mathematics course content and should dictate course content.

A QUICK LAUNDRY LIST

A fairly complete laundry list of mathematical topics can be prepared by recognizing that there are six basic operations which are possibly needed in a technical program:

1. addition
2. subtraction
3. multiplication
4. division
5. powers
6. roots

These operations are often applied to the following mathematical forms and topics:

A. arithmetic numbers
   1. integers
   2. fractions
   3. decimals

B. algebraic numbers

C. geometric theorems

D. trigonometric functions

E. logarithmic functions

F. exponential functions

Add to these the possibilities of converting between forms and representation of these forms on number lines or sketches or graphs and we have a fuller laundry list. The inclusion of calculus imposes additional operations on the basic forms, namely differentiation and integration. Quite naturally, an ideal would have all of these forms and operations totally mastered by the technical student. The likelihood is that the technical specialty teacher demands all of them and the mathematics people can't produce all of them and the circle of finger-pointing with "you teach them" charges comes into play. Where do we draw the limits?

THE LIMITATIONS

The real limitations are time and the level of the incoming student plus room in the curriculum. One might consider requiring an extra mathematics course or two in the student's program . . . fine, but who yields the time? Do we give up a couple of liberal arts courses? Or a couple of specialty courses? There are too many objectors!

A suggested solution is to construct the usual mathematics courses with basic and recurrent topics. If a specialty teacher insists on a set of additional topics, let him be the judge . . . offer him a minimum (3 hours per week) course with him sacrificing a three-hour technical course. If he hedges, let him teach these topics within the framework of his specialties. The likelihood is that his topics are merely special applications of some basic and recurrent topics.

APPLICATIONS

Who teaches applications . . . the mathematics people or the technical people? In a multiple-technology institution, the answer is clear by asking the question: "Can a mathematics teacher know electrical and mechanical and chemical and manufacturing and design applications?" Further, ask the very real question: "Can genuine applications be taught in mathematics before the student learns the scientific knowledge required to enter the application?"

Consider the last question with a case in point. The mathematics teacher wishes to teach an application involving simultaneous linear systems. His selection of technology source is electronics and Kirchhoff's Law. He draws an electrical schematic and sets up three equations and three unknowns. At this point he may as well be talking in a foreign tongue if the students are not readied through an electricity course for Kirchhoff's law because the instructor can't really explain to the students where the equations come from. The only reasonable order is for the mathematics teacher to teach simultaneous linear system and convince the students that they will have applications in their beloved field of electronics under a thing called Kirchhoff's Law; shortly thereafter the electronics teacher teaches Kirchhoff's Law and produces the equations. The electronics teacher then reminds the students about the methods of solution of simultaneous systems as taught in mathematics class. The latter route is far superior to the former. The electronics instructor has to provide the bridge between theory and application while the mathematics teacher brings the student to the bridge and tells him what's on the other side.

THE BRIDGE

One of the constant concerns in technical programs involves "bridging the gap." In view of the previous example, the only applications that a mathematics teacher can realistically teach are geometry-based or algebra-based applications. His bridge is a geometry theorem or fact. The electronics bridge is an electrical theorem or fact which the mathematics teacher cannot use because of the timing involved. However, the mathematics teacher can help build the bridge by constantly using methods of display, such as sketches, line drawings, graphs, charts, etc., from which facts and information can be formulated. With this display device, the mathematics teacher continually develops the student's intuitive or pragmatic approach.

THE APPROACH

As suggested here, the approach suggested is an intuitive one, where the teacher wants the student to "see" a relationship in a picture or graph or chart. This is the essence of technical mathematics and it stands under the label "intuitive" or "pragmatic" as opposed to "rigorous." Consider a simple case where a student knows how to express a number in standard notation and wants to find its logarithm. If he "sees" the exponent in the power of ten as the characteristic of the logarithm, he can readily handle the confusing problem of the characteristic in one simple flash of intuition and that's probably all he wants or needs. The exponent is clearly displayed, begging for the student to "see" it as the desired characteristic.

CONCLUSION

A few of us technical mathematics teachers delight in a monument that we have built for ourselves by pointing out <u>one</u> student of a few years back who is doing his master's degree in mathematics. How about, instead, pointing to scores of working technicians with pride in the claim that "I provided all of them with the basic and recurrent mathematics that got them through their technical courses and provided them entry into their careers!"

A DEVELOPMENTAL CONCEPT OF VOCATIONAL EDUCATION

The 1968 Vocational Education Amendments introduced a developmental concept of Vocational Education and nowhere is this clearer than in the Congressional definition of Vocational Education as contained in the Act itself.

> "The term 'vocational education' means vocational or technical training or retraining--designed to prepare individuals for gainful employment as semiskilled or skilled workers or technicians or subprofessionals in recognized occupations and in new and emerging occupations or to prepare individuals for enrollment in advanced technical education programs--and such term includes vocational guidance and counseling (individually or through group instruction) in connection with such training or for the purpose of facilitating occupational choices; instruction related to the occupation or occupations for which the students are in training or instruction necessary for students to benefit from such training; job placement; --"

This definition of Vocational Education and the various subsections contained in the 1968 Vocational Education Amendments serve to expand the range of

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Presentation by Dr. Gene Bottoms, Associate State Director, Vocational Education, Georgia State Department of Education.

activities and purposes that can be considered as vocational. The broadening role that has been given to vocational education is in part, the result of two very important facts about today's society. First, with continued specialization in our society, we have hundreds of different job ladders. Entrance into a job on the lower rung of this ladder requires job-seeking skills and appropriate job attitudes. Recently, Dr. John Fulmer of Georgia Tech in a study of the hospitality industry in Atlanta, for example, found over 35 different job ladders. He also found that entrance into the lower level jobs on those ladders required little if any vocational training beyond industrial discipline. In a much larger study of jobs available for disadvantaged adults in Louisville, Kentucky Dr. Fulmer found similar results. In a discussion recently with a person in the construction field, I learned that for each carpenter who is a craftsman, there were four or five individuals who were classified either as an apprentice or carpenter helper. Such facts support the need for continued high level technical and skilled training as well as purposefully designed training programs to prepare individuals to enter the range of jobs that exist below these levels.

The second important fact about our society is that in our progression from a simple to an exceedingly complex society we have virtually eliminated the traditional means by which adolescents develop into working adults. In former years, youth were constantly surrounded by, and early involved in, work. However, with the passing of the agrarian culture and the small factories and businesses within the home, work as an activity has become increasingly less a part of the lives of youth until now it is chiefly an activity engaged in behind fences and brick walls. Too often the results have been that many youth are reaching the age for entering work without an adequate and realistic knowledge about jobs available, without the job attitudes and industrial discipline necessary for job success, and without being familiar with the tools, materials and processes of work settings. Such youth are usable to enter and hold many of the basic entry-level jobs because of a lack of these skills. The protestant ethic, the need to validate one's worth through gainful employment, has served this country well and the nation's responsible leaders are looking to vocational education as a means of perpetuating those habits of industry and attitudes of social responsibility that accompany mature citizenship. For vocational education to carry out its broadening responsibilities a restructuring of thinking regarding the scope, focus, level, and setting of vocational education towards a comprehensive and articulated structure will be required.

Under a broadening umbrella of vocational education, we should be able to put aside many of those issues that have served to divide and consume our energies in the past and to formulate a comprehensive and developmental program design for vocational education as a central part of the total educational system. We should be able to resolve in positive ways the following kinds of issues: First, we should be able to more clearly differentiate between the intent, nature, and structure of vocational education at the secondary and post-secondary levels. Secondly, we should be able to devise vocational education program designs that will meet varying levels of needs from the highest level of technical training to those needing only a couple of weeks preparation for entrance into the world of work. Third, we should be able to resolve the issues between trade and industrial education and industrial arts because under the umbrella of the 1968 Amendments a role for

both can be defined. Fourth, we should be able to find ways to make maximum use of our resources for the maximum numbers of students. Often I hear the statement that many of our post-secondary vocational institutions throughout the country are operating at far less than capacity. I wonder if maybe we haven't saddled ourselves with a kind of curriculum design that does not allow the maximum utilization of space and facilities for the maximum number of students. Fifth, we should be able to find ways to resolve the narrow service line concept as compared to a comprehensive concept of vocational education.

In addition to uniting the various vocational elements into a sequential program, the design must provide for integrating those proven elements of vocational education into the total school effort in such a manner as to render school experiences more meaningful for all students. Education for life must include preparation for work, since this is the essential activity of man's endeavor.

There is a need to consider the possible intent, nature, and structure of a developmental program of vocational education as part of the total education program. I would like to consider these in their application at the elementary, junior high, secondary, and post-secondary and adult levels. I would also like to consider some essential elements that should be built into such a program design.

Elementary level. The exemplary section of the 1968 Vocational Education Amendments has served to direct our focus on the elementary school level. Here our intent should be two-fold: first, to enhance students' acquisition of basic academic skills by providing an alternate to the more abstract learning style which has so often become the major approach to learning in education; and second, to allow students to acquire positive attitudes toward work and an increased knowledge of self in relation to work. More specifically the objectives include the following.

1. The student at the lower elementary level can identify workers in the school and can state how the different workers contribute to his well being and the welfare of the school community.

2. The student at the lower elementary level can identify most observable occupations in the community and can state the contribution made by each to the well being of the community.

3. The student at middle and upper elementary levels broadens his contact with workers beyond the school and those readily observable in the community. He can identify persons in various occupations, and can make some differentiation between occupational skills used by different individuals, the prerequisite skills needed to enter these occupations, and the contribution each makes to our society.

4. The student at upper elementary level begins to differentiate those self characteristics and environmental factors that can have impact upon his future and begins to discuss ways in which others have minimized negative factors and have maximized positive ones.

5. The student at the middle and upper elementary levels demonstrates how certain knowledges and skills acquired in different school subjects are applied in different work roles.

6. The student at the upper elementary levels demonstrates a knowledge of most common resources and approaches available for learning about and assessing the world of work.

7. The student, during his school activities, expresses a positive attitude toward self, others, education, and different types of work roles.

8. The student discusses the importance of team work in different work settings, cooperates with others in order to reach a common goal, and can express the importance of his contributions and that of others in reaching a common goal.

The nature of the activities provided students should be sequential in nature moving from familiarization with the kinds of occupations and activities within the students immediate environment of the home and school, to the immediate community, and later to the broader community. Activities should be both orientational and informational in nature and should also consist of opportunities for youth to perform simulated work tasks across the occupational spectrum.

In accomplishing or in implementing the program at the elementary school level one approach would be to fuse into the existing school curriculum those experiences that would serve as a base for enhancing traditional learning expected at this level and could also serve to accomplish certain career development objectives.

Middle or junior high school level. The program at this level should provide activities and experiences which would enhance self understanding in relationship to the world of work. While the increasing complexities of modern living suggest the desirability of the school strengthening its holding power upon early dropouts, the school should recognize that in spite of all its efforts some students will drop out. For these students, the school must devise strategies for compressing experiences normally offered over a period of several years into a one- or two-year period. Thus experiences provided the terminal student at this level must include the acquisition and the basic habits of industry and the assistance needed to enter and adjust to some type of work. For the college bound, the intent of the program at this level is to prepare the student to make future educational and occupational decisions rather than to force him to commit himself to specific educational and vocational choice. For the student who will terminate his formal education with high school graduation the program should provide opportunities to explore a wide variety of occupational areas and levels. In other words, the program enables the student to narrow down his next step. Specifically, objectives for this program might include the following.

1. The student further differentiates his self characteristics (interests, values, abilities, and personality traits) from those

of others, and can identify broad occupational areas and levels that may be more appropriate for his self characteristics.

2. The student differentiates between the several broad occupational areas in terms of (a) a potential satisfaction each might offer him, (b) the nature of work tasks performed, (c) the future impact technology might have on particular occupational areas, (d) the contributions and importance of particular occupational areas to our society, and (e) the future demand for workers in broad occupational areas.

3. The student identifies the different educational areas both in the immediate and more distant future that are available, the nature and purpose of each, the avenues toward which each can lead, and tentatively assesses the value each offers him in terms of his possible vocational choices. He demonstrates how knowledge and skills acquired in different subject matter areas relate to performing different work roles. He recognizes the personal and social significance that work has in the lives of individuals at varying levels within the occupational structure.

4. The student identifies future decisions he must make in order to reach different goals. He identifies those personal and environmental efforts that impinge upon his future decisions. He assesses possible steps he might take in minimizing negative factors and maximizing positive ones and considers the possible consequences each has for him.

5. The student makes a choice of a broad occupational area to study in greater depth.

6. The student can differentiate between the major occupations that make up a broad occupational area and can make some differentiation of these occupations in terms of (a) the amount and type of education needed for entrance; (b) the content, tools, setting, products or services of these occupations; (c) their value to society; (d) their ability to provide him with the type of life style he desires; (e) whether or not they can satisfy his interests and values; (f) whether or not they seem appropriate for him.

7. The student makes a decision to commit himself to a type of education or training which will lead him toward some specific occupational areas.

Each of the activities provided students at this level should provide for intensive work tryouts, either through a simulated, or direct work experience or extensive observation of work in a number of settings. Such experiences should be followed by providing the student an opportunity to examine these experiences in terms of the implications that they have for him. Many of our prevocational programs in the past have failed to provide youth an opportunity to personalize the meaning such experiences have for him.

The vocational program at the middle school level could be structured in two phases, Level 1 and Level 2.

It is proposed that Level 1 be an across-the-board exploratory program in which students are familiarized with several broad occupational fields. The intent of this program is on building a base for future decision making. This program will enable students to see a relationship between existing and future education courses forming in the adult work world.

It is proposed that Level 2 provide students an opportunity to explore particular occupational areas in greater depth. In this program students would be provided the opportunity to try themselves out in simulated work experiences to learn first-hand if they really have an interest in a particular occupational area. In addition, students would learn something about the use of tools, materials and processes of these particular work areas. It is recommended that one approach to such prevocational areas would include industrial, human service, agriculture, business and distribution, and other curriculum areas.

Secondary Level. The aim of the vocational program at the secondary level should be either to prepare the individual for entrance into some job at some level, or for post-secondary vocational and technical education. The specific objectives should include helping students to (1) develop plans for implementing his vocational preference, whether it be entering work after high school or continuing his education; (2) execute these plans by appropriate course work and job experiences and obtaining an entry-level job or entrance into further education or training.

The nature of the vocational program at this level should consist of cooperative program, laboratory or a combination of both. At previous levels the use of these kinds of experiences were for the purposes of exploration or for the development of employability skills; whereas, at this level the use of these experiences would be for the purpose of job preparation.

The vocational curriculum structure at this level should be designed to prepare the individual for entrance into a family or cluster of occupations or for post-secondary education. To accomplish this will require a broader curriculum design than has usually been the case at the secondary level. Most youth are not mature enough to narrow down to find occupational choice by the 10th or 11th grade level. The program should be so structured that it is flexible enough to meet the varying needs of individuals from different socio-economic levels. In addition, the secondary program should be designed so those students who plan to go directly to work after high school could co-op during their senior year after they had spent two years in a vocational cluster area. For those youths who plan to go on to post-secondary education, advanced placement programs should be developed allowing some students to enroll in post-secondary vocational education during their senior year.

Post-secondary and adult level. Our aim must be dual. It must be: (1) to prepare for initial entrance and to upgrade individuals for employment in highly technical and skilled occupations; (2) to provide more basic and short-range vocational programs to prepare large numbers of individuals for employment (individuals who have reached adulthood without the skills necessary to pursue higher level technical and skill training).

Nature of program. The nature of this program should be: (1) for high level technical and skilled training, curriculum patterns of one and two years in length are usually sufficient; (2) for shorter range training - short programs, more emphasis on attitudes.

Structure. The curriculum structure must be formed to serve both groups at the same time, and often under the same instructor simply because this is the only way we can maximize the use of our vocational resources.

As we look at the present structure of the vocational program at the post-secondary level, we will find a variety of settings. However, there is a real danger to post-secondary vocational and technical education and that is that it may become so institutionalized that it fails to meet the needs of many individuals in our society.

Such a developmental concept of vocational education which I have set forth in outline is structured on a continuum from a focus on informational and exploratory needs to a focus on preparation and can provide a career oriented thread at all levels of education. Such a pattern would fit the career development process as we know it. Furthermore, vocational education at each level would be designed to prepare the student for the next level.

Regardless of the type of vocational structure that finally emerges as an outgrowth of the 1968 Amendments, I think there are some rather essential points that need to be kept in mind.

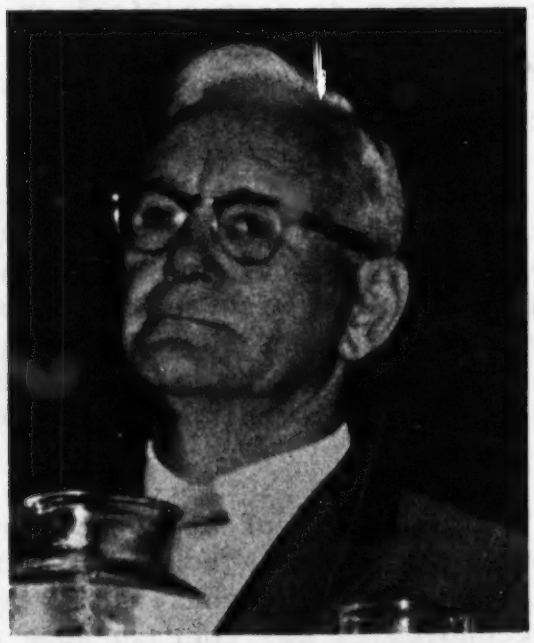
First, the approach, objectives, and content of the curriculum needs to be flexible and comprehensive enough to consider the characteristics and needs of different subpopulations at particular levels. The program should become more comprehensive in order to accommodate a greater variety of individual needs and differences. To assume that a student must be in the eleventh grade before he can enter a co-op program is to deny potentially valuable educational experiences to those who drop out prior to that time, and to advocate that slow learners or other alienated youth cannot be placed in part-time jobs demonstrates ignorance of the success of placement efforts in special education and vocational rehabilitation programs. To contend that the acquisition of job skills is the major objective in work experience programs is to fail to recognize the importance of such experiences in the development of self knowledge, work habits, and other attributes which may be even more essential to future success for many individuals. The assumption that all jobs require one or two years of post-secondary preparation before entrance into the labor market indicates a failure to recognize both the diversity of the occupational structure and the characteristics of certain subpopulations within our society.

Second, whatever vocational design emerges should provide for an interdisciplinary approach in which vocational education is more closely tied and related to the rest of the school program. Developmental programs for vocational education as discussed provides for a continuation of career oriented experiences from K-14 around which other academic subject matters can be related.

Third, the developmental program of vocational education that is to emerge must be one for all students, rather than one designed to select some to go into certain kinds of occupations and leave the rest behind. For example, the program design should not be seen as strictly a mining operation in which only those with certain talent are chosen, but rather a farming approach in which all individuals are provided with opportunities to grow and develop.

Fourth, structuring of a developmental and comprehensive program has certain operational implications for vocational educators. It means a change in vocational planning from a single level or service line base to a more comprehensive frame of reference if we are to maximize the use of our resources for the maximum number of students. It becomes necessary in planning secondary vocational programs to give consideration, both to the post-secondary vocational program to which it will feed, and to the prevocational program that will precede it. It would also mean that vocational programs must be planned in conjunction with the total educational program. The approach to vocational planning would have to be one in which the attempt is to look comprehensively at a community's need for vocational education rather than to look at that community's needs in terms of a particular service.

In summary, the leadership role that we must accept is no small task. However, the greatest barrier to its accomplishment lies within ourselves. Like Pogo we have met the enemy, and that is <u>us</u>. Our shortsightedness must be converted into broad directional goals that have a potential for influencing the total educational enterprise. Our fears of loss of identity must be set aside in favor of the development of an educational system that is vital to all students, and we must be willing to face the insecurity of change. We must cease looking inward to the neat structures that we have so well conceived; cease to accelerate when we feel that we have lost our direction; cease to persist in formerly appropriate response to situations in which such responses are no longer appropriate. Instead, we must engage in dialogue with the entire educational community. We must turn outwardly to other segments of the school and help in an effort to render school experiences more meaningful for all students. The 1968 Amendments have given a challenge to vocational educators. The decision and actions we take will determine whether vocational education will become a complementary part of the educational system or whether it is destined to remain as a supplementary aspect.



PREPARING SUPPORTIVE PERSONNEL FOR NEW AND EMERGING TECHNOLOGIES

Administrators of programs to prepare technicians or other specialized supportive personnel have a special interest in new or emerging occupations for specialized personnel in our increasingly technological society.

There are those who say that few, if any, new technologies exist; and in one sense they probably are right. They reason that when a specialized field of work for technicians or comparable personnel has developed to a point where a school administrator and his advisory committee should organize a training program, a significant number of persons are already employed at the tasks which must be performed by the "new" specialists. In a "new" technology such as aerospace or biomedical equipment technology, the person who performs as a technician may have graduated from a preparatory program in a junior college, technical institute, or other educational institution, or have gained an equivalent preparation which lead to employment in the field. He brings to the job sufficient experience to permit the employer to teach him the special knowledge, skills, techniques, and apparatus with which he must work.

Many of the technicians who enter the aircraft development and production industry or the aerospace industry graduate from technician education programs as electronic, mechanical design, or industrial production

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Presentation by Dr. Walter J. Brooking, Program Office, Technical Education, U. S. Office of Education.

technicians. Upon entering employment in the aerospace industry, they become known as aeronautical or aerospace technicians. Similarly electronic technician graduates who find employment with biomedical equipment manufacturers, distributors, or users become classified as biomedical equipment technicians.

However, there comes a time when a large enough number of a particular kind of specialized technicians or supportive workers are needed to justify organizing a program specifically for them. When such specialized programs are initiated with the full cooperation of employers and other advisory personnel, the required general and specialized preparatory information and experiences can be taught in an educational institution or in a cooperative earning and learning program which is a part of an organized preparatory program.

The heart of a program to teach any new kind of technology is the technical specialties content of the program which makes it distinctively different from other technician or specialist programs. Some regularly taught technologies may contain some elements which are related to, but are not sufficiently specific for, the new occupational objective. For example, a biomedical equipment technician must master a combination of electronic and mechanical or instrumentation technologies. In addition, he must learn something about the organization of hospitals or institutions using biomedical laboratory equipment, their lines of authority, their working environment; and, if the graduate is employed by a user of the equipment, he must certainly learn some human anatomy and physiological information and concepts.

NEW AND/OR EMERGING TECHNOLOGIES

Some technologies, like air pollution control, are new in the sense that few or no organized educational programs exist to prepare specialists for the technology. Other fields now require supportive personnel with a technician or equivalent education because of increasing technological sophistication. Among the best examples of these emerging fields are the agricultural and related technologies. A relatively small number of excellent programs have demonstrated their effectiveness in preparing farm managers or workers, forest managers or workers, and off-farm business managers or specialized workers who require the equivalent of a technician education. These programs are not new, but they should be emerging in greater numbers.

In a broad sense, many of the most commonly known technician education programs for the distributive, office, and health occupations can be classified as emerging because the present numbers of graduates still fall far short of the Nation's need. There are still not enough graduates from high quality programs to educate mechanical, civil, or architectural and building technicians; registered nurses; electronic data processing programmers and system analysts; or specialized secretaries to meet the Nation's need.

Other new and emerging specialized occupational careers are being created by a redistribution of the work formerly performed by professionals. By restructuring the duties of the professional, certain technical tasks and

services are delegated to well-prepared specialized supportive personnel. These new occupations are emerging in the health, legal, urban planning, management, and many other fields.

WHY BE CONCERNED WITH EMERGING TECHNOLOGIES?

There is a more compelling reason for administrators of educational institutions to consider identification and initiation of programs to prepare new kinds of technicians as one of their high priority responsibilities. The reason is the lead-time of 5 years required to plan, initiate, and establish a new program for these kinds of specialized personnel.

There are three major groups of workers required in the Nation's work force:

1. Professional scientists, engineers, or managers who can usually be educated within a baccalaureate program or by 1 to 3 years of specialization beyond the baccalaureate. These are the professional workers.

2. Technicians and other specialized supportive personnel who usually require 2 to 3 years of rigorous, specialized post high school education different from the first 2 years of a baccalaureate program.

3. Skilled workers in the field who are usually taught their specialized skills in a few months to a year in on-the-job orientation and training programs.

<u>At least 5 years are required to initiate and solidly establish</u> new technician or similar specialist education programs in an institution. At least 1 year should be spent by the administrative staff of the institution working with a local or regional planning and advisory committee, surveying and planning for the proposed program. A second year is needed to employ and prepare specialized staff and to plan and equip the necessary laboratories and facilities. Two more years are required to graduate the first class; and yet another year is required to modify and refine the program, based on the feedback from graduate students and employers so the second graduating class (in the fifth year of the program) will be best prepared to enter the field.

HOW CAN A NEW TECHNOLOGY BE IDENTIFIED?

A field of technology for which technicians or similar specialists may be required is characterized by the following:

1. The existence of specialized professionals in the field and commonly recognized clusters or groups of related employment opportunities for both the professionals and technicians.

2. National scientific or technical societies or associations, having a total membership of several thousand professionals and other leading practitioners, whose programs and publications promote a

substantive development and reporting of the progress and specialized aspects of their particular branch of applied science. The specialty is sufficiently different from other branches of applied science to justify such organizations or associations because of a significant body of specialized knowledge is required by a large number of specialists.

3. The application of scientific knowledge in a specialized field which is well enough developed and sufficiently in demand by the present and forseeable social environment to require a division of the work to provide research, development, and production and serving. The professionals lead in formulating theory and practice; technicians, with the aid of skilled workers, assist them by making tests, products, equipment, apparatus, procedural or material prototypes, and providing special services.

4. A requirement of usually 2 years and less than 4 years of rigorous, college-level study, or its equivalent, to learn the basic physical and/or biological science; the supporting mathematics; and the special techniques, processes, apparatus, related technical and interpersonal skills, services, and competencies in order to be employed as a beginning technician.

5. A body of specialized knowledge which requires a technician preparatory curriculum to be a sequence of related courses. Beginning with courses in basic applied science and mathematics underlying the field and at least one elementary course in the techniques, procedures, processes, and apparatus of the specialty, each succeeding course must contribute to the depth of understanding and the student's skills and competencies in the specialty. Such a curriculum must provide the variety and depth of preparation the beginning technician must have to cope with inevitable changes that will occur in his special field.

Unless a field of applied science is broad enough and at the same time sufficiently specialized to meet the foregoing criteria, it is probably too narrow to identify it as a field requiring specially trained technicians. The emergence of an identifiable cadre of professional specialists in a developing field of applied science is the first indication of the emergence of a new field of technology.

In light of the foregoing, let us consider some new and/or emerging technician and specialist programs.

ENVIRONMENTAL CONTROL TECHNICIANS

One of the most urgent needs of our times is to organize and apply the specialized technical and scientific knowledge and practices required to improve the environment in which we live. The Federal and State legislation enacted in the sixties to control water pollution and develop and conserve water resources is well known. Air pollution, soil pollution, and sanitation are matters of public concern which have become so urgent that legislative bodies, the public media, and the citizens-at-large have begun to demand

that these and other environmental factors be placed among the highest priorities for action.

Programs will be needed in increasing numbers to prepare the following kinds of technicians:

* Water Conservation and Pollution Control Technician.
* Air Pollution Technician.
* Soil Reclamation, Management, and Conservation Technician.
* Solid Waste Disposal Technician.
* Sanitation Technician
* Environmental Health Technician.

A few water pollution and water resource development technician education programs are in operation now; however there are not enough graduates to fill all the requirements.

Air pollution technician programs are only now emerging. We know of one which will graduate its first class this year. Air pollution technicians function as specialized chemical technicians because air pollution is largely caused by chemical products of combustion which in sunlight react with air to produce smog. This technology is so new that the scientific and engineering knowledge has only recently become organized and translatable into action on a sufficient scale to permit delegation of part of the work to technicians. Well-prepared chemical technicans could, with some specialization, become effective air pollution technicians, but there are not enough chemical technicians to meet the requirements of the chemical industry. It is evident that more air pollution technician education programs must be developed to meet the increasing need.

TECHNICIANS DEALING WITH THE PROBLEMS OF URBAN LIVING

The continuing trend toward urbanization of our Nation, combined with increased application of modern technology, seems to multiply the problem of urban planning and living. Renewal of urban housing and institutional facilities; planning of transportation for increasingly mobile and larger numbers of people; provision of utilities such as light, water, gas and electricity; maintenance of law and order; and provision of recreational and related facilities all result in a constant state of change and challenge to urban planners; however, relatively few technicians or similar specialists are being prepared to assist in planning and improving urban living. Some of the technicians and specialists required in this field are:

* Urban Planning and Development Technician.
* Police Science Technician.
* Crime Laboratory Technician.
* Correctional Institution Technician.
* Community Service Assistant.
* Public Recreation Specialist.
* Pest Control and Exterminator (specialized agricultural chemical)

Of the foregoing, police science and related programs are the only ones which have developed in any significant number. It is doubtful, however, if

there are enough of these yet to meet the requirements, especially for some of the more specialized kinds of technicians dealing with urban law enforcement and correctional programs.

COMMUNITY OR PUBLIC SERVICE SPECIALISTS

In an increasingly urbanized society, public or community service occupations tend to be equated with the problems of urban living. However, the circumstances of human living generate needs for similar services in urban, suburban and rural communities. Programs exist or have been proposed to prepare the following kinds of community or public service specialists:

* Building Inspection Technician.
* Municipal and Government Accounting Specialist.
* Recreation Supervisor.
* Aide to Elderly Persons Who Live Alone.
* Social Service Assistant.
* Institutional Child Care Specialist.
* Government Mid-Management Specialist.
* Legal Technician.
* Mortuary Science Technician.

MEDICAL AND RELATED HEALTH SPECIALISTS

A concern for better health care for the Nation's population, as reflected by medicare and medicaid legislation, has resulted in serious shortages of traditional health personnel such as nurses and physicians. This shortage has become so acute in recent years as to require the preparation of additional kinds of specialists to cope with services growing out of new scientific developments and to assume responsibility for certain kinds of work previously done by professional nurses and doctors. Some of the emerging programs to provide new kinds of health-related specialists in greater numbers are:

* Nursing Home Administrator.
* Pediatric Nursing Practitioner.
* Midwifery Specialist.
* Dietary Technician.
* Electroencephalograph Technician.
* Inhalation Therapy Technician.
* Occupational Therapy Technician.
* Operating Room Technician.
* Optometric Technician.
* Orthopedic and Prosthetic Technician.
* Physical Therapy Assistant.
* Nuclear Medical Technician.
* Radiological Technician.

TEACHING AND RELATED ASSISTANTS

Various kinds of assistants for professional teachers of kindergarten through twelfth grade and post-secondary programs represent a potentially large number of occupational opportunities, many of which are only now

beginning to emerge. Greater use of team teaching and of a greater variety of teaching and learning aids and devices make it both possible and desirable to employ teaching assistants in increasing numbers.

One evidence of the newness of these occupations is the fact that only a few States have officially recognized the teaching assistant by providing descriptions of his function, and thus delineating his educational requirements and employment opportunities. Various teacher organizations have advocated assistants for teachers in their discussions with school boards or educational administrators. The rationale used is that a professional teacher can provide better services to students if he can perform as a professional and delegate some of the routine or less professionally demanding activities to appropriately prepared assistants.

Examples of teacher or instructional assistants are:

* Technician in science or engineering departments.
* Library Technical Assistant.
* Nursery or Child Care Center Specialist.
* Science Laboratory Assistant (in elementary and secondary physics, biology, etc., laboratories)
* Media and Visual Aids Assistant.
* Supervised Play or Physical Education Assistant.
* Tutorial Assistant for languages or social studies.
* Head Start Staff Workers.

Technicians are commonly used in science-or engineering-related technician education programs, in many post-secondary programs, and in many baccalaureate engineering education programs. Library technical assistants are not yet commonly used in school libraries, but more and more institutions are finding their services both economical and useful. Sometimes they can communicate with a student population as well as or better than, a professional librarian, particularly if the librarian is preoccupied with administrative duties. The U. S. Civil Service Commission recognizes Library Technicians, and several government agencies use them extensively.

Nursery and child care center specialists have been graduates from a few institutions for many years. The need for such specialists is growing, particularly in urban communities where child care centers are needed to permit working mothers to leave their children in a safe and stimulating environment.

It is likely that the teaching assistant with a 2-year associate degree will be one of the rapidly growing occupational positions in the future. This means that many more programs need to be developed to meet the increasing demand for this specialist.

AVIATION AND AEROSPACE SPECIALISTS

The continued growth and technological developments of military and civilian aviation and the aerospace industry have generated an urgent need for additional personnel. In the past, airline pilots usually received their initial training in the military, but the increasing need for pilots

is exceeding the capacity of the military to supply them. The same is true for other kinds of personnel in the aerospace and aeronautical industry. Programs are emerging at the post high school level for the following:

* Aviation Pilot.
* Aviation Navigator.
* Aviation Mechanical and Diagnostic Technician.
* Air Traffic Controller.
* Aviation Meteorology Technician.
* Telemetry and Communication Technician.
* Airport Management Technician.

The resourcefulness of post-secondary technician and other specialist educators has been demonstrated in the initiation of programs in most of the foregoing. Many make cooperative work and study arrangements, since referred facilities and equipment cannot be made available in schools. Obviously, a 2-year or even 3-year post high school program cannot prepare an inexperienced youth to be a qualified multi-engine plane pilot, air traffic controller, or any other of the foregoing specialists. But the program can provide what it is intended to provide: a graduate sufficiently prepared to begin employment and proceed by education and experience on the job to the various stages of higher qualification.

PHYSICAL SCIENCE AND RELATED ENGINEERING TECHNICIANS

The needs of private and public employers for technicians in the more common physical science and related engineering fields, such as the mechanical design and production, civil, metallurgical, chemical, air-conditioning and refrigeration, architectural and building technologies, have never been more than 1/3 filled by graduates of high quality technician preparatory programs. In addition, urgent demands for new kinds of technicians in the physical science and related engineering fields are being generated by the rising tide of technological development. Some have been listed under other headings such as aerospace and water or air pollution control. The following are examples of occupations which are emerging and in the developmental stage.

* Electro-Mechanical Technician.
* Physical Radiological Technician.
* Nuclear Technician.
* Numerical Control Technician.
* Computerized Drafting and Design Technician.
* Scientific Data Processing Technician.
* Physical Oceanographic Technician.
* Underwater Engineering Technician.
* Electro-Optic Technician.
* Bio-Medical Equipment Technician.

BIOLOGICAL TECHNICIANS AND SPECIALISTS

In applied biological sciences and in biological research, the technological information explosion and the proliferation of fields of specialization are rapidly creating a variety of requirements for biological

technicians. They must perform many new kinds of biological and related laboratory tasks outside the health and agricultural fields, often with little supervision; and they must assist professional biological and related scientists in research or other scientific endeavors.

The whole subject of biological technicians and specialists appears to be ripe for definitive research and developmental piloting of programs. A few programs have been initiated in recent years. Graduates of the programs are in such demand that they usually can choose among several employers.

Some emerging biology-based technician programs are:

* Biological Laboratory Technician.
* Bio-Chemical or Pharmaceutical Technician.
* Bio-Instrumentation Technician.
* Bio-Medical Laboratory Technician.

DISTRIBUTION AND COMMERCIAL OR INSTITUTIONAL SERVICES

More and more industrial, commercial, governmental, and institutional establishments are seeking graduates of post high school occupational specialist programs to fill requirements for personnel supportive to professional managers and proprietors or to merchandise and service the products of our highly technological society.

AGRICULTURAL AND RELATED TECHNICIANS

Agricultural science and engineering are by no means new, and the application of agricultural technology has made our Nation the leading producer of food and fiber in the world. However, programs to educate technicians to work as farm owners-operators, as employees of farm operators or in the specialized off-farm industry supporting agricultural production or processing are rapidly emerging. It is necessary to prepare a more highly educated and technically competent cadre of owners and operators to cope with agriculture's more industrialized, sophisticated, and scientific operations.

Agricultural production in the United States makes increasing use of capital and mechanization, which tends to increase the size of the production unit or the specialization of it and to reduce the semiskill or unskilled labor required. A larger capital investment is required to provide land, equipment, and operating capital for a farm operator or farm workman than is required in a steel mill or in the petro-chemical industry, both of which have capital per employee ratios among the highest in our system. The intelligent management of a capital investment of 100 thousand to 1 million dollars requires substantially more than high school education. Two-year post high school agricultural and related technology programs, a few of which have been in operation for many years, have proved to be successful in providing a far more adequate preparation for the farm owner or farm-related businessman than a high school education.

In recent years there has been a gratifying growth in the number of agricultural and related technology programs initiated. Some of the programs

which are emerging and probably should be developed in many more communities are:

* Animal Science Technician.
* Livestock Production Technician.
* Dairy Production Technician.
* Poultry Technician (production).
* Horseraising Technician
* Small Laboratory Animal Care and Veterinarian's Assistant Technician.
* Fresh-Water Fish Culture Technician.
* Plant Science Technician.
* Farm Crop Production Technician.
* Orchard and Vineyard Technician.
* Soil Reclamation and Conservation Technician.
* Ornamental Horticulture Technician.
* Floriculture Technician.
* Nursery Operation Technician.
* Turf Grass Management Technician.
* Arboriculture Technician.
* Landscape Development Technician.
* Agricultural Business Technician.
* Agricultural Chemicals Technician.
* Pest Control and Extermination Technician.
* Agricultural Equipment Technician.
* Food Processing Technician.
* Grain, Feed, Seed, and Farm Supply Technician.
* Forest Technician.
* Wildlife and Conservation Technician.
* Park and Recreational Land Management Technician.

The increased interest in horseracing and riding has brought about the reemergence and initiation of a horseracing technology program in one institution. This particular technology program was brought about as a result of an increasing use of horses in recreational activities.

The small laboratory-animal care and veterinarian assistant technology programs serve both the medical research laboratories and pharmaceutical industries which require small animals, and provide trained assistants for veterinarians for agricultural animal producers or small animal hospitals. Many more excellent employment opportunities are available for graduates of the few programs currently operating than can be filled by the graduates. Clearly, there is a growing need for more such programs.

Fresh-water fish culture is already a very large industry in the United States, meeting our growing population's need for food and recreation. This technology program evidently should be offered more widely. It provides a means of greater utilization of streams and lakes (both natural and artificial) and can provide attractive business opportunities and employment for a growing number of people in rural areas.

OCEANOGRAPHIC AND MARINE TECHNICIANS

The national program for exploration of space in the sixties is well known. Scientific research and development to explore and utilize the oceans and area underlying them represents another major challenge which already requires large numbers of technicians and which increasingly will demand the technical skills and understanding of technicians and similar specialists.

In the realm of physical science as it relates to the ocean, the following technical specialists are required:

* Physical Oceanographic Technician. (to study ocean current, ocean chemistry, map the ocean floor, etc.)
* Ocean Floor Mineral Discovery and Extraction Technician
* Underwater Engineering Technician. (to develop structures for underwater habitation construction and similar engineering activities.)

In the biological sciences, the following specialists are required:

* Marine Life Technician.
* Ocean Fish and Fisheries Technician.
* Marine Aquaculture Technician.

Only a few programs exist to educate technicians in any of these fields. Considerably more research is needed to define the separate kinds of programs to best prepare the various oceanographic and marine technicians. Almost all specialites in this category have some scientific knowledge and technical skills in common, but each is sufficiently different to require different technical courses and specialization.

Aquaculture will probably be one of the very important sources of food in the future. Fish culture is already a large industry in inland lakes and waters, but it has not yet begun to attain the significance in the ocean estuaries and along the shores that it must to provide a significant source of food for our growing population.

Much of the scientific research has been done in each of these fields, but only recently have the various phases of oceanographic and marine science become so important commercially as to require a growing number of highly skilled technicians. The 1 billion dollar ocean fishing industry which employs over 1 million persons, is at present the largest employer in all of the foregoing fields. However, the United States ocean fishing industry has yet to apply the modern fishing technology used by other nations.

INITIATION OF NEW PROGRAMS

The decision to start a program to educate any kind of technician or specialist is an important responsibility of the chief administrator of the school and his controlling board. Each technician program requires a separate justification and involves a long-term staff and financial commitment which are continuing responsibilities of the institution. No program should

be undertaken unless a careful study, made with advisory committee support, gives convincing evidence that the technicians are needed and that the need will continue in the foreseeable future. A program should not be started unless there is a good prospect of its being needed for several (perhaps 10) years, with the normal modifications made to meet technological change.

Evidence of need to initiate new programs usually is developed by surveys of the potential student population and employment opportunities in the locality, area, region, or even the Nation. To conduct such a survey for each proposed new technician program is the responsibility of the school administration. A special advisory committee is needed to help collect information, evaluate needs, and develop local support, especially among employers.

The survey becomes the justification for the program and also defines details of its content. Studies and surveys to determine the need for a particular technician program must usually involve agencies other than the school. Conferences with employers, the Department of Labor, the State Board for Vocational and Technical Education, and other interested State or regional agencies yield important data on the capability of existing programs to meet the needs and help to describe local, State, regional, and the national requirements for the technicians.

To explore existing programs is probably the least expensive and most rewarding approach to the study of a proposed new program. Most institutions with successful or new programs welcome visits by administrators and staff members who plan to start similar programs. Much can be learned about curriculum, cost, staff, facilities, student recruitment, and placement from the experience of others. Such visits provide invaluable opportunity to see laboratories, farm, or clinical facilities, learn details about the program, locate consultants, learn about clinical or field experience arrangements and requirements, and study many more important and pertinent matters. As a matter of fact, no program to educate a new kind of technician or specialist should be undertaken without an exhaustive study of established or experimental programs in the field or closely related to it. It is seldom that a justifiable need to prepare a new kind of specialist is so new or novel that no other institution in the Nation has begun to develop a program to meet that need. One or more prototype or experimental preparatory program exists for most of the nonbaccalaureate occupational specialists listed in this presentation. It is too expensive in time, money, and human effort to rediscover what already has laboriously been learned by those who have well-established or even partially proven programs to prepare new kinds of technicians or specialists. To share program information has always been a hallmark of technical educators. This priceless resource should never be overlooked in starting new programs.

Informal advisory service and use of consultants also contribute significantly to the excellence of programs. Many experienced department heads and staff members from institutions with well-established, successful programs are willing to serve for a reasonable recompense. They are especially helpful when a program is being initiated, details of facilities and equipment are being determined, and instructional materials are being sought or organized. State directors of vocational education, regional and national

representatives of the U. S. Office of Education, and associations such as the American Society of Engineering Education, American Association of Junior Colleges, and American Technical Education Association can suggest exemplary programs and sources of consultants for various kinds of technician programs.

There is some evidence that in order to justify adequate facilities and faculty an institution needs to enroll 60 to 100 freshman students per year in each technician program.

The elements of the curriculum will be evident from the survey analysis which provides the details of what abilities and capabilities the technicians must have, what they must be able to do, and with whom they will work.

After determining that a new program is needed and feasible for the institution, the administration's first step is to select and employ a qualified department head to develop the program. He (or she) should then develop the curriculum, plan and direct the development of the necessary facilities, arrange for clinical or other work experience in community facilities if needed or desirable, assist in selecting the instructors for the program, work with the library staff to provide the library materials for the program, assist in student recruitment and selection, and provide faculty and student orientation to the new program.

The head instructor should work closely with the advisory committee on all aspects of the program in order to acquaint himself with all important considerations involved and reflect them in the program and to insure the support of all agencies represented. All possibilities to establish a cooperative program should be explored.

If licensure or other official regulation or recognition of the technician's work is necessary, the department head and the school administrator should acquaint themselves with details of the requirements and take the necessary steps before the program starts to insure that the requirements will be met.

APPENDICES

Appendix A

The Program

NATIONAL CLINIC ON TECHNICAL EDUCATION

sponsored by

United States Office of Education
and
American Technical Education Association

Hosted by

Southeastern Region of
American Technical Education Association

April 22, 23, 24, 1970

Sheraton Beach Hotel
19400 Collins Avenue
Miami Beach, Florida

Theme: "Technical Education For A Changing World"

Tuesday, April 21, 1970

6:00 p.m. - 8:30 p.m.	Registration Social Hour (Dutch)

Wednesday, April 22, 1970

9:00 a.m. - 10:00 a.m.	Registration
10:30 a.m. - 12:00 noon	FIRST GENERAL SESSION
Presiding:	Lucian Lombardi, President American Technical Education Association
Recorder:	Edward A. Bamber, Chairman Aerospace Department Miami-Dade Junior College, North Miami, Florida
Welcome:	Robert W. Caldwell, Consultant Technical Education Florida State Department of Education Tallahassee, Florida
Address:	"The Amended Vocational Act in Action" * Leon P. Minear, Director Division of Technical and Vocational Education U. S. Office of Education
Address:	"Dynamics of Technical Education" Jerry Dobrovolny, Head Department of General Engineering University of Illinois Urbana, Illinois

*Presented by Dr. Walter J. Brooking

12:00 noon - 1:30 p.m.	LUNCH ON YOUR OWN
1:30 p.m. - 3:00 p.m.	SECOND GENERAL SESSION
SUBJECT I	
Presiding:	Ruth Midjaas, Consultant Oakland Schools Pontiac, Michigan
Recorder:	Ormond F. Whipple, Chairman Technical Engineering Division Broward Junior College Fort Lauderdale, Florida
Address:	"Training Technicians in Allied Health Post-Secondary Programs." Ralph Kuhli, Director Allied Medical Professions & Services American Medical Association Chicago, Illinois
SUBJECT II	
Address:	"Research in Technical Education" Arthur Nelson, President Technical Education Research Center Cambridge, Massachusetts
SUBJECT III	
Address:	"Co-op Programs in Occupational Education" Louise Egan, Consultant Florida State Department of Education
3:00 p.m. - 3:15 p.m.	COFFEE BREAK

3:15 p.m. - 4:30 p.m. — DISCUSSION GROUPS

SUBJECT I
SUBJECT II
SUBJECT III

5:00 p.m. - 8:30 p.m. — VISIT EXHIBITS

Thursday, April 23, 1970

9:00 a.m. - 10:30 a.m. — THIRD GENERAL SESSION

Presiding: John Standridge, Exec. Director
Vocational-Technical and Adult Education
Atlanta-Fulton County Schools
Atlanta, Georgia

Recorder: Earl W. Cameron, Asst. Professor
Engineering Technology
Virginia Commonwealth University
Richmond, Virginia

Announcements:

Address: "Tomorrow's Technology Today"
Marjorie Jones
Materials Research Division
National Cash Register Company
Dayton, Ohio

10:30 a.m. - 1:30 p.m. — VISIT EXHIBITS

12:00 noon - 1:30 p.m. — LUNCH ON YOUR OWN

1:30 p.m. - 3:00 p.m. — FOURTH GENERAL SESSION

SUBJECT IV

Presiding:
Roland L. Roy
Assistant Superintendent
Duplin County Schools
Kenansville, North Carolina

Recorder:
John V. Ankeney, Director
School of Engineering Technology
Virginia Commonwealth University
Richmond, Virginia

Address:
"The Use of The State Advisory Council as Delegated by the '68 Act"
Joseph R. Clary, Executive Director
State Advisory Council
North Carolina

SUBJECT V

Address:
"Accreditation, Licensure and Registry in Allied Health Programs"
Kenneth G. Skaggs, Coordinator
Occupational Education Project
American Association of Junior Colleges

SUBJECT VI

Address:
"Occupational Education in the Private Sector"
A. Harvey Belitsky
W. E. Upjohn Institute for Employment Research
Washington, D. C.

3:00 p.m. - 3:15 p.m. — COFFEE BREAK

3:15 p.m. - 4:30 p.m. — DISCUSSION GROUPS

SUBJECT IV
SUBJECT V
SUBJECT VI

5:00 p.m. - 8:30 p.m. — VISIT EXHIBITS

Friday, April 24, 1970

9:00 a.m. - 12:00 noon — EXHIBITS OPEN

9:00 a.m. - 10:30 a.m. — FIFTH GENERAL SESSION

SUBJECT VII

Presiding: Edmond P. Garvey, President
Springfield Technical Community College
Springfield, Massachusetts

Recorder: George Bowers, Dean
School of Applied Science
Miami University
Oxford, Ohio 45056

Address: "Student Recruitment in Occupational Education"
S. Joseph Fantl, Public Relations Coordinator
Greenville Technical Education Center, Greenville, S. C.

SUBJECT VIII

Address: "The Technician - How Much Mathematics"
Frank L. Juzzli, President
Norwalk State Technical College
Norwalk, Connecticut

SUBJECT IX

Address: "A Developmental Concept of Vocational Education"
Gene Bottoms, Assoc. State Director
Vocational Education
State Department of Education
Atlanta, Georgia

10:30 a.m. - 10:45 a.m. COFFEE BREAK

10:45 a.m. - 12:00 noon DISCUSSION GROUPS

SUBJECT VII
SUBJECT VIII
SUBJECT IX

12:00 noon - 1:45 p.m. SIXTH GENERAL SESSION

LUNCHEON

Presiding: George Mehallis, Director
Technical/Vocational Studies
Miami-Dade Junior College, North
Miami, Florida

Recorder: Ormond F. Whipple, Chairman
Technical Engineering Division
Broward Junior College
Fort Lauderdale, Florida

Address: "Emerging Technologies"
Walter J. Brooking
Division of Vocational and Technical Education
U. S. Office of Education
Washington, D. C.

Announcements:

2:00 p.m. TOURS

Miami-Dade Junior College, North
Lindsey Hopkins Vocational Center

Appendix B

PLANNING COMMITTEE

Program Co-Chairmen

Dr. George Mehallis, Director
Technical/Vocational Studies
Miami-Dade Junior College, North
Miami, Florida

Dr. Walter J. Brooking
Division of Vocational and Technical Education
U. S. Office of Education
Washington, D. C.

ALABAMA

J. B. Weston, Head
Electronics Department
Alabama School of Trade and Technology
Gadsden, Alabama

FLORIDA

Dr. J. W. Beck, Chairman
Division of Allied Health Studies
Miami-Dade Junior College, North
Miami, Florida

James J. Guthrie, Assistant to Director
Technical/Vocational Studies
Miami-Dade Junior College
Miami, Florida

Fred C. Murray, Director
High School Vocational and Technical Education
Dade County Board of Public Instruction
Miami, Florida

Dr. Thomas W. Strickland, Director
Technical and Health Occupations Education
Division of Vocational, Technical and Adult Education
Department of Education
Tallahassee, Florida

GEORGIA

John H. Lloyd, State Supervisor
Technical Education
Post-Secondary and Adult Programs
Division of Vocational Education
Atlanta, Georgia

John F. Standridge, Exec. Director
Vocational-Technical and Adult Education
Atlanta-Fulton County Schools
Atlanta, Georgia

NORTH CAROLINA

Roland L. Roy, Asst. Superintendent
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SOUTH CAROLINA

S. Joseph Fantl, Public Relations Coordinator
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Edward Weld, Director
Nashville State Technical Institute
1717 West End Building
Nashville, Tennessee

Appendix C

ATTENDANCE BY STATES

Alabama	9	Missouri	1
Alaska	0	Montana	1
Arizona	1	Nebraska	1
Arkansas	0	Nevada	2
California	2	New Hampshire	1
Colorado	10	New Jersey	5
Connecticut	6	New Mexico	3
Delaware	2	New York	33
D. C.	12	North Carolina	47
Florida	91	North Dakota	0
Georgia	16	Ohio	15
Hawaii	0	Oklahoma	5
Idaho	1	Oregon	0
Illinois	22	Pennsylvania	10
Indiana	2	Rhode Island	1
Iowa	3	South Carolina	7
Kansas	3	South Dakota	1
Kentucky	1	Tennessee	13
Louisiana	0	Texas	15
Maine	2	Utah	2
Maryland	1	Vermont	0
Massachusetts	8	Virginia	8
Michigan	19	Washington	0
Minnesota	3	West Virginia	6
Mississippi	23	Wisconsin	12
		Wyoming	0

Canada	3
Nigeria	1
Puerto Rico	2

Appendix D

EXHIBITORS

NAME AND ADDRESS	REPRESENTATIVE
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Appendix E

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